Forensic Investigation of Courthouse Square

555 Court Street NE
Salem, Oregon

May 2, 2011

A world of capabilities delivered locally

Golder Associates

FORENSIC INVESTIGATION OF COURTHOUSE SQUARE

555 Court Street NE
Salem, Oregon

REPORT

Submitted To: Marion County and Salem Area Mass Transit District
451 Division Street, Suite 200
PO Box 14500
Salem, OR 97309

Submitted By: Golder Associates Inc.
18300 NE Union Hill Road, Suite 200
Redmond, WA 98052 USA

May, 2011

Project No. 103-93451.100

A world of capabilities delivered locally

Golder Associates

EXECUTIVE SUMMARY

On January 24, 2011, Golder Associates Inc. (Golder) received an Announcement of Notice of Award for RFP #10-1002 Investigation Services for Courthouse Square informing us that we had been selected for the forensic investigation program. Upon execution of a professional services contract between Marion County and Golder on February 3, 2011, we commenced our investigation of the Courthouse Square building and bus mall. The scope of work for the project, as defined in the request for proposal (RFP), was divided into three tasks which were delineated as follows.

C.1 Task One: Data Gathering/Review: This task will involve all necessary components associated with the review of the original project planning/organization, design and construction documentation and interviews with key participants as noted in item #2 below. The Owners will provide access to documents and public records concerning the project that are necessary for the selected firm to complete this task.

C.1.1 Documentation to be reviewed may include, but is not limited to:

C.1.1.1 Planning/Organization

C.1.1.1.1 Review project organization, roles and responsibilities of major players to clearly define roles and responsibilities and to determine whether all elements of the project were adequately addressed (internal resources & external contractors, subs, consultants).

C.1.1.1.2 Review of key participants' professional credentials, noting requirements by building codes, state governing bodies/professional review boards at the time of design and construction.

C.1.1.2.1 Review of initial project notes/meeting notes/documents/processes starting with the formation of the Courthouse Square Oversight Committee in December 1997 for the re-design of the Courthouse Square building.

C.1.1.2.2 Review of key participants' contracts and amendments listing original scope of services and associated fee and changes of service with changes in fee (both additional services and reduction of services/fees).

C.1.1.2 Architect and engineer (structural, geotechnical, mechanical, electrical) plans and specification documents, such as permit drawings, as-built drawings, project specifications, structural calculations, shop drawings, structural observations and field sketches; all in-progress (design phase) cost estimates and budget documentation; all value engineering documentation; and contracts/amendments of key participants.

C.1.1.3 Construction documents such as contracts, change orders, requests for information (RFI), special inspection reports, concrete mix designs, contractor's project schedule, superintendent's observations/field notes and materials testing documentation.

C.1.1.4 Courthouse Square Project meeting notes, memos, photographs, media articles/news clips, and subsequent engineering reports or studies. Reconstruction of all project finances, including all contracts and amendments for all contracted parties.

C.1.2 Interview key participants and review roles and responsibilities:

- County elected officials and staff (past and present)
- Transit board members and staff (past and present)
- Hired consultants/special inspectors
- Architects/Engineers
- Contractors/subcontractors
- Project Management (contracted services)

C.2 Task Two: Analysis will include the analytical portion of the work. Information gathered during Task One will be organized and developed into a traceable record of investigation activities as well as a timeline of project events. This task will include the assessment and evaluation of the findings and development of conclusions of the investigative work, including whether or not there is any evidence of misconduct, malfeasance or negligence, or a lack of professional standard of care by any of the parties involved with the Project may have occurred.

C.3 Deliverable: The Final report will be a formal written deliverable with clear findings and conclusions of the investigation of the Courthouse Square project. This report will be presented to the owners of the project. The final report will include but not be limited to an executive summary; background/description; documents review; interviews and field investigation/observations; photos/charts; discussion; conclusions, including findings of misconduct, malfeasance, negligence, or lack of professional standard of care, if any; lessons to be learned; and recommended process or safeguards to implement for future public improvement projects.

TASK C1: DATA GATHERING/REVIEW

An initial project meeting was held at the Marion County offices in Salem, Oregon on January 27, 2011. Representing Marion County at the meeting were Jan Fritz, Deputy County Administrative Officer, Barbara Young, Government Relations Manager, and Peggy Mitchell, Contracts Compliance Analyst. Golder participants were Mark Liebman, Senior Consultant and Project Manager, and Alec Liebman, Forensic Investigator. The focus of the meeting was the scope, schedule and logistics for the program. Golder was informed that the hardcopy documentation for the Courthouse Square project was available for our review at the Marion County Facilities Management office currently located at 325 13th St SE in Salem, OR. Our designated point of contact, Daniel Wilson, Facilities Analyst, would be available to assist us in locating the project files and provide onsite support during our document search and review. The forensic investigation schedule agreed upon at the meeting can be found in Appendix A.

On February 6, 2011, Mark Liebman and Alec Liebman traveled to Salem to spend the week going through the project files and reviewing the plans, specifications, change orders, RFIs, field and laboratory reports and other project documentation. During the hardcopy review process approximately 1,000 pages of documentation were copied for further review. We were also informed that a Marion County website containing project documentation was available for our use, but the volume of hardcopy information to be reviewed precluded our investigation of this material while onsite. It also came to our attention that many documents had been copied onto a six (6) disc set containing individual tiff files of the project documentation copied page by page. While many of the pages available on the discs were duplicates of the hardcopy, both the electronic and hardcopy files contained documentation not found in the other. This led to a thorough review of the documents both in hardcopy form and on the electronic copy on disc.

The disc files contained over 45,000 individual pages of information. Including the non-duplicate information on the discs and in the electronic file, our best estimate is that approximately 60,000 pages of information were available for our review. The discs were not organized or searchable, so every tiff file had to be opened to determine if it contained relevant information. Many of these pages contained data on items such as architectural finishes and other items not pertinent to our investigation. Appendix B contains a list of the documents reviewed during the data gathering/review exercise.

Along with our documentation review, we visited Courthouse Square to visually assess the conditions. For this assessment on February 10, 2011, we were joined by the other members of our investigative team; Andrew Walker, Golder's geotechnical engineer designated for the project, and Todd Perbix, SE and Principal with Perbix Bykonen, our structural engineering team partner. Our walkthrough allowed us to observe the irregularities in the building slabs, the cracking in the stairwells, the separation of the interior finishes, and the curving of the columns and distress in the slabs in the bus mall.

On April 14 through April 18, 2011, Mark Liebman returned to Salem to conduct a series of face to face and phone interviews with project participants. The interviewees included former Marion County and Salem Area Mass Transit District staff, Leonard Lodder, the project architect (formerly with Arbuckle Costic Architects), and Craig Lewis and Dan Petrusich of Melvin Mark Companies. Written responses were also received from Dave Hays of Pence/Kelly Construction. The questions posed and items discussed included recollections of the project during the design and construction phases, individual roles and responsibilities, and specific issues noted during the document review and analysis process that were pertinent to the current condition of Courthouse Square.

TASK C.2: ANALYSIS

Upon our return to our offices in Redmond, Washington following our initial onsite data review, copies of many of the project documentation pages were disseminated to each team member. Andrew Walker received the field reports and testing results pertinent to the geotechnical component of the project, and the plans, specifications and original geotechnical reports were made available electronically. Todd Perbix and his support staff at Perbix Bykonen received the plans, specifications, field notes, laboratory concrete data, RFIs and other documentation relevant to the structural engineering design and construction process; along with electronic access to other pertinent documents. Alec Liebman began to compile all the field and laboratory reports regarding the Quality Assurance / Quality Control (QA/AC) testing and inspection of the excavation, backfill and compaction, along with all the concrete inspection, sampling and break data. Under the direction of Mark Liebman, each began their analysis; while Mark began a broad review of the project.

The analysis of the structural design was performed by Todd Perbix and Nick Carter of Perbix Bykonen. For the analysis of the post-tensioning and other structural components, they employed Adapt software; the same software utilized in the initial design. Andrew Walker reviewed the geotechnical reports and field notes as the basis for his analysis. Alec Liebman reviewed the lab and field data for the backfill compaction and concrete testing and created spreadsheets containing this information for inclusion in this report. Mark Liebman's analysis focused on an overview of the project, reconciling seemingly disparate information, reviewing RFI's, Change Orders and communications between Courthouse Square team members, and working with the forensic team members in each of their respective areas of responsibility.

TASK C.3: FINDINGS AND CONCLUSIONS

The scope of work defined in the forensic services RFP was meant to provide Marion County and Salem Area Mass Transit District with a better understanding of the contracting, design, and construction processes that led to the current conditions at Courthouse Square. As has been well documented elsewhere, only two proposals were received in response to the original RFP and the project was awarded to the development team consisting of Dan Berrey, Arbuckle Costic Architecture and

Pence/Kelly Construction. With the termination of the contract with Dan Berrey, Marion County and Salem Area Mass Transit District elected to restructure the project and to continue to work with Arbuckle Costic and Pence/Kelly Construction; the latter subsequently awarded the construction contract for the project after a competitive bidding process.

Based on the available information, it appears that the original project design and construction team had limited previous experience with a project of the size and scope of Courthouse Square. We had assumed that Mr. Berrey had some previous experience working with Arbuckle Costic and they, in turn, had worked with Century West Engineering. It also seemed that these parties had worked with Pence/Kelly Construction. These assumptions were subsequently confirmed during the interview process. Leonard Lodder mentioned during his interview that he had no previous experience with post-tension construction but noted that Mike Hayford of Century West, the structural designer of record, was purported to be an expert in this regard. This was confirmed by Melvin Mark representatives to be their understanding, as well.

Financial, design and scheduling considerations led to Arbuckle Costic and Century West Engineering being retained for the Courthouse Square project. As a result, a rigorous process of competition, and qualification based review of credentials, was left out of the process. At this juncture, with the project budget now in line with expectations, Marion County and Salem Area Mass Transit District had reason to believe the project was on track. Subsequent developments suggest that the overall inexperience of the design team and contractor with post-tension structures led to an underestimation of the significance of the flaws in the design and an inability to recognize the significance of early indicators of problems during construction.

As part of our approach to providing an understanding of what went wrong with the process at Courthouse Square, it was paramount for our investigative team to analyze the factors that led to the current state of affairs. Based on our review and analysis of the documentation, we have arrived at the conclusion that the primary technical errors were made in the structural design of the facility. The total contribution of all other factors may have lessened the quality of the structure but would likely not have resulted in a building that could not fulfill its function or that posed a life/safety hazard to its occupants.

From the Summary of the Perbix Bykonen Structural Analysis Memo:

Our conclusion is, simply stated, that most of the serviceability and almost all of the safety concerns noted in the structure stem from various problems in the structural engineers' work. Because of the scope of the deficiencies' noted, and the fact that many of them are safety issues or are issues bearing on the satisfactory long term performance of both the Bus Mall and the Office building, we believe that the engineer of record did not meet the Standard of Care.

The credentials available for Mike Hayford suggest he was one member of the design team who may have had previous experience with similar structures. However, the success of these other projects was not investigated or confirmed. While Billy Wasson, Marion County's Project Coordinator, had recently worked on another large facility, his responsibilities seem to have been largely organizational and financial; a fact he confirmed. Randy Franke, John Whittington, Jeff Hamm, Bob McCune and David Hartwig all were involved with the project but did not have the background or training to have provided technical review during design or construction. Craig Lewis, Melvin Mark Companies' project manager, noted that his responsibility was one of communication and coordination, which is precisely what is portrayed in the project documentation. Pence/Kelly's expertise in concrete construction is well documented but their experience with post-tension structures was not extensive. It is unlikely that anyone, outside of a structural engineer performing a peer review, would have been aware of the significance of the shortcomings in the design. However, it is feasible that a project team with more experience in the mode of construction employed at Courthouse Square might have become concerned earlier in the process.

During the interview process, it was noted by a number of parties that the design drawings had been submitted to the City of Salem for review. Apparently, the design issues that have come to light were not identified during this review process. No one involved with the project that was with the City of Salem at the time was available to be interviewed about this issue.

As the project moved towards and into the construction phase, the documentation notes changes in the design team that also might have raised concerns on the part of the project coordinators, architect or project manager. Mike Hayford, structural design engineer of record, was let go by the design firm and replaced by Timothy Terich, an engineer who had just recently earned his PE. Numerous email exchanges between design team members indicate that clarification of and changes to the structural design were being requested by the architect and contractor as the project headed for construction. Appendix C contains examples of these communications. Once under construction, the documentation of the communication between the parties and the field notes demonstrate a continuous process of re-engineering the structure. And, during this process, Tim Terich resigned from Century West Engineering (which dissolved its structural engineering division) and joined Tim R. Froelich Consulting Engineers where he completed this project.

It is not unusual for numerous RFIs to be sent to the structural engineer during construction. But it is likely not typical to deal with the extensive key personnel changes occurring at Century West during the project. These circumstances might have warranted an examination of the capability of Century West to continue to service the project and an external review of the design. It appears, however, that the assurances provided by Century West were sufficient to allay any concerns on the part of the project team members.

It is apparent from the documentation that Tim Terich worked diligently to address the issues at Courthouse Square. However, as noted, he had recently earned his PE and questions might have been raised about his ability to take on this responsibility; given the lack of support once Mike Hayford left Century West. Later, the troubling circumstances of Mr. Terich leaving Century West and the firm no longer having structural engineering capabilities might also have raised serious concerns. However, the interviewees, when queried on the matter, universally confirmed that they were satisfied with the responses they had received. While at this point in the process it is questionable what steps might have been taken, future projects will certainly benefit from greater concern and a proactive reaction to such crucial changes in project staff.

There are other issues revealed in the documentation. There were some errors in the control of the over excavation for the project that likely impacted the project budget more than the project quality. The testing lab ran moisture-density tests in the lab and performed in-place density testing in the field that, while somewhat typical for the industry, did not contribute to the quality of the subgrade preparation. While these errors do not appear contributory to the current problem, future projects will benefit from higher expectations and more proactive project management in regards to quality control. There were also issues with the concrete that remain unexplained by the available project documentation or subsequent reports. While we do not suggest another study be carried out at the present time, further testing may be required as part of any remediation strategy.

This report concludes with a section on lessons learned from Courthouse Square. These include employing a rigorous competitive process and carefully reviewing the credentials of key project firms and participants. It will be prudent for Marion County and Salem Area Mass Transit District to seek peer review of design in the future, and for the County to employ an Owner's Representative who will represent the interests of the agencies during project scoping and contracting and a 'Clerk of the Works'; who is technically experienced in the mode of construction and charged with ensuring the quality of the design and construction.

In closing, we note that both repair and replacement strategies have been put forth in other studies and reports. While we have not included any specific recommendation in this report we have offered thoughts for consideration in the structural analysis memo, as follows.

Aside from the demolition and rebuilding of the Square, there is a less intensive strategy the owner's may pursue to retain all or most of the structures. To be sure, this strategy is not inexpensive, but depending on the performance level acceptable to the stakeholder's, this approach should represent a reduced remediation cost compared to demolition and rebuilding. Structurally, the strategy that may be considered for the entire facility can be described as a Safety and Serviceability approach.

Table of Contents

EXECUTIVE SUMMARY ES-1
1.0 BACKGROUND INFORMATION 1
2.0 PROJECT ORGANIZATION AND MANAGEMENT 4
3.0 ARCHITECTURAL DESIGN 7
4.0 GEOTECHNICAL ENGINEERING 8
4.1 Geotechnical Review 8
4.1.1 Field Reports and Correspondence 9
4.1.2 Comments 9
4.1.3 Final Conclusion 10
5.0 STRUCTURAL ENGINEERING 11
5.1 Structural Analysis 11
5.1.1 Structural Observation Reports and Communication 11
6.0 CONSTRUCTION PROCESS 13
7.0 PROJECT FINANCES 14
8.0 QUALITY ASSURANCE AND QUALITY CONTROL 16
8.1 Excavation, Backfill and Compaction Control 16
8.2 Concrete Inspection and Testing 17
8.3 Post Tension Stressing 19
8.4 Structural and Reinforcing Steel 20
9.0 LESSONS LEARNED 21
9.1 Owner's Representative 21
9.2 Competitive Contracting 21
9.3 Peer Review of Design 21
9.4 Clerk of the Works 21
10.0 CLOSING 23

List of Appendices

Appendix A Golder Associates Inc. Work Plan
Appendix B Courthouse Square Documents Catalog
Appendix C Design Communications
Appendix D Construction Communications
Appendix E Structural Analysis Results - Perbix Bykonen Draft Memo Dated April 26, 2011
Appendix F Requests for Information
Appendix G Design Fee Communication between Arbuckle Costic Architecture and Billy Wasson dated February 16, 1999
Appendix H Change Order Requests from Pence/Kelly
Appendix I Request for Additional Fees by Century West Engineering
Appendix J Carlson Testing Soil Lab Results
Appendix K Carlson Testing In-Place Density Test Results
Appendix L Carlson Testing Concrete Compressive Strength Test Results
Appendix M Adapt Software Analysis

1.0 BACKGROUND INFORMATION

Courthouse Square consists of a 5 story office building, bus mall, and north block area. It is located at 555 Court St NE in Salem, Oregon and occupies one square block bounded by Court St NE to the south, Chemeketa St NE to the north, High St NE to the west, and Church St NE to the east. There is one level of underground parking throughout the block. The facility was designed to house Marion County departments, Salem Mass Transit District offices, retail establishments; and to serve as a bus transit center. The key participants in the development, design and construction of the facility were:

Marion County, Owner
Salem Area Mass Transit District, Owner
Melvin Mark Companies, Portland, OR, Developer/Project Manager
Arbuckle Costic Architects, Salem, OR, Designer
Century West Engineering, Salem, OR, Geotechnical/Environmental/Structural Engineers
Pence/Kelly Construction, Salem, OR, Contractor
Carlson Testing, Salem, OR, Quality Control

The project design involved the services of:

Architectural Cost Consultants, Cost Consultants, Tigard, OR
Westech Engineering, Civil Engineering, Salem, OR
Interface Engineering, Mechanical/Electrical Engineering, Portland, WA
Leisinger Design, Landscape Design, Salem, OR
Altermatt Associates, Acoustic/Vibration Engineering, Portland, OR
Lerch-Bates N.A., Vertical Transportation Engineering, Snohomish, WA
Meng Associates, Value Engineering, Seattle, WA

Sub-contractors to Pence/Kelly included:

River-Bend Sand and Gravel, Concrete Suppliers, Salem OR
Reliable Fabrication, Steel Fabricators. Eugene, OR
Davidson's Masonry, Masonry Contractor, Salem, OR
Wadsworth Excavation, Excavation and Backfill, Salem, OR
Capitol Concrete Construction, Concrete Placement, Aumsville, OR
C&J Rebar, Rebar Supplier, Beavercreek, OR

The current condition of the facility has been well documented in reports and studies by others. This investigation sought to examine the evolution of the project and determine what historic factors may have contributed to the problems now evident in the structure. To better understand these factors, the following documents relevant to the project history were examined:

- Courthouse Square Project History (1974-2000) Information Packet
- 2 volumes of newspaper clippings dating from dating from December 1995 to December 1999
- Documentation and communication in the project files, CDs and electronic database

From conception, the project was not viewed favorably in the local press. The manner in which the project was developed, the role of early key participants, and the scope of the project and associated costs were all called into question. With the restructuring of the development and project team, creation of the Courthouse Square Special Project Oversight Committee and Citizens Advisory Committee, and downscaling of the design, it appeared that the project was on track as it headed for construction. So the current state of affairs is extremely problematic for Marion County and Salem Area Mass Transit District and their constituents in the community.

In reviewing the project documentation, it is evident that problems began to be noticed during the design and construction phases. Appendices C and D contain correspondence and field reports delineating this fact. Problems were first noted during the design phase with numerous (Request for information) RFIs, as supported by communication between Arbuckle Costic, Pence/Kelly and Century West. The first physical signs of a problem manifested as cracking at the tops of the columns at the slab/column interface. At the time, the significance of these occurrences was, according to the documentation, not recognized. The single exception is contained in a memo dated February 18, 2000, in which Craig Lewis suggested to Leonard Lodder that a third party evaluation of the cause of the cracking at the top of the columns beneath the bus mall, and determination of whether the issue was cosmetic or structural, would be prudent (see Appendix D, page 20). A response to this request for a third party evaluation by Arbuckle Costic or any subsequent action taken by Melvin Mark Companies or any other members of the project team has not been found in the project documentation.

Once the building was occupied, the tenants began to note cracks and separation of the interior finishes, racking of doors and windows, and unevenness in the floors. By 2002, the issues warranted investigation and the first of many studies was commissioned. Following a number of additional investigations, and based on the mounting evidence that suggested the facility was unsafe, Sera Architecture issued notification to vacate the bus mall in July of 2010. A subsequent City of Salem notice to vacate resulted in Marion County, Salem Mass Transit District, and the other tenants leaving the building in September 2010.

Studies performed at Courthouse Square include:

- David Evans and Associates, Inc., Marion County Courthouse Square Evaluation Report, dated September 16, 2003
- David Evans and Associates, Inc., Courthouse Square Office Floor Slabs – Structural Evaluation, dated April 2009
- Miller Consulting Engineers, Marion County Building Remediation, dated October 30, 2009
- M.R. Richards Engineering Inc., Review of post-tensioned concrete slab system, January 2009

- Sera Architecture, Marion County Courthouse Square Remediation Study Final Report, dated March 14, 2011
- Kramer Gehlen & Associates, Structural Peer Review of the Remediation Study Final Report, dated March 3, 2011

2.0 PROJECT ORGANIZATION AND MANAGEMENT

The formal scope of this investigation begins with the formation of the Courthouse Square Oversight Committee in December 1997. At this time, the original developer had been replaced by Melvin Mark Companies, Randy Curtis had resigned as Marion County's project manager, and R.G. Andersen-Wyckoff was no longer the project coordinator for Salem Area Mass Transit District. Arbuckle Costic had signed an interim agreement for design development and Pence/Kelly was providing value engineering and cost estimating services. Following is a list of the key participants in the project.

Courthouse Square Project Team Key Participants

Billy Wasson, Marion County – project coordinator
John Whittington, Salem Mass Transit District – project coordinator
Craig Lewis, Melvin Mark Companies – project manager
Dan Petrusich, Melvin Mark Companies – project director
Byron Courts, Melvin Mark Companies – systems engineer
Leonard Lodder, Arbuckle Costic Architects – project architect
Tim Terich, Century West Engineering – project engineer
Mike Hayford, Century West Engineering – design engineer of record
William A. Smith, Century West Engineering – project geotechnical engineer
Glenn Ross, Century West Engineering – author of the geotechnical reports
Steve Schaad, Pence/Kelly Construction – project superintendent
Dave Hays, Pence/Kelly – project manager
John Gremmels, Pence/Kelly Construction – project engineer

Courthouse Square Special Project Oversight Committee

Justice Ed Peterson
Kathy Keene
Randy Compton
Maynard Hammar
Jerry Vessello
John MacMillan

In April of 1998, the Special Project Oversight Committee (SPOC) recommended that final design for Courthouse Square be completed but did not include in their recommendation that the project be constructed.

Citizens Advisory Committee

Carl Beach
David Cameron
Maynard Hammer
Mark Messmer
Jerry Vessello

In August of 1998, the Citizens Advisory Committee (CAC) recommended that the project be constructed. Based on the responses received to a competitive invitation to bid issued pursuant to public contracting rules, the CAC recommended that the project be awarded to the low bidder, Pence/Kelly Construction.

County Commissioners

Mary Pearmine served January 1991 - January 1999
Gary Heer served January 1980 - February 1998 (resigned)
Don Wyant, Jr. - appointed March 1998 - January 1999
Randy Franke - served January 1979 - January 2003
Patti Milne - January 1999 - present
Mike Ryan - served January 1999 - October 2003 (resigned)

Transit Board Members and Staff

Subdistrict #1 Geoff Guilfoy 7/25/96 - 6/30/97 (Appointed and Resigned)
Nancy Towslee 7/01/97 - 6/30/99 (Elected)
Kimberly Williams 7/01/99 - 6/14/00 (Elected and Resigned)
(Changed name to Johnson before taking office)
Nancy Towslee 7/27/00 - 4/13/01 (Appointed and Resigned)
(Changed name to Horn after appointment to office)
Subdistrict #2 John Miller 12/21/95 - 06/30/97 (Appointed)
Robert Newton 7/01/97 - 01/15/99 (Elected and Resigned)
Dennis Koho 7/01/99 - 06/30/01 (Appointed)
Subdistrict #3 Casey Campbell 7/01/87 - 6/30/99 (Elected in 1987/1991/1995)
George Bell 7/01/99 - 11/09/01 (Elected)
Subdistrict #4 Bill Frey 7/01/93 - 6/30/97 (Elected)
Eric Swenson 7/01/97 - 10/2/00 (Elected and Resigned)
Sonny Ortiz 12/14/00 - 06/30/01 (Appointed)
Subdistrict #5 Nancy Cooney 7/27/95 - 2/28/97 (Appointed and Resigned)
Mark Wieprecht 5/22/97 - 6/30/99 (Appointed)
Jerry Thompson 7/01/99 - Present (Elected 1999, 2003, 2007)
Subdistrict #6 Luis Caraballo 12/19/91 - 9/23/99 (Appointed 1991. Elected 1993/1997. Resigned)
Lloyd Chapman 10/28/99 – 6/30/09 (Appointed; Elected 2005)
Subdistrict #7 Marcia Kelley 1/26/89 - Present (Appointed 1989/Elected 1989, 1991, 1995, 1999. 2003, 2007)

Based on the available documentation, Billy Wasson appears to have been sufficiently qualified for his role. This was confirmed during the interview process. He had recently been responsible for a major project for the Marion County Corrections Department and was familiar with construction on the scale of the Courthouse Square program. John Whittington was involved early on in the project. He did not have a technical background but, like Billy, his responsibilities were organizational and financial and he counted on the design and construction staff regarding technical matters. Craig Lewis' role was facilitating communication and coordination between team members. It was clear during the interview process that he and Dan Petrusich considered the design team to have responsibility for the technical concerns relevant to the current issues and consciously stayed on their side of the technical/programmatic divide. Byron Courts, the systems engineer, apparently provided input in his area of specialization but was not

involved with structural issues. Any concern on the part of Melvin Mark representatives regarding items of current concern regarding the post-tension structural system were purported to have been noted during the early stages of their project involvement, but documentation of this has not been identified.

The design team was lead by Leonard Lodder, a certified American Institute of Architects (AIA) architect, registered in the State of Oregon. Mr. Lodder earned his architecture degree in 1980. The structural designer of record, Mike Hayford, had 26 years of experience when the project began and was a licensed PE in the State of Oregon. His resume indicates that he had some previous experience designing structures similar to Courthouse Square. Tim Terich, who replaced Mr. Hayford, was an EIT when Century West provided their project team to Arbuckle Costic Architects at the beginning of the project, and apparently earned his PE shortly thereafter. The Century West team information did not include resumes or bios for the geotechnical or environmental engineering participants. Pence/Kelly was considered an expert in the field of structural concrete construction at the time the project was designed and constructed. While we do not have all their particulars, we understand that Steve Schaad and Dave Hays had considerable experience with the company.

Based on the available credentials, there is little evidence to suggest that Marion County and Salem Area Mass Transit District had reason for concern regarding the qualifications of the key participants at the initiation of the project.

3.0 ARCHITECTURAL DESIGN

Based on our review of Architectural Design Drawings and Specifications, dated December 30, 1998, we do not feel that there are intrinsic elements in the architectural design of the facility that were specific contributors to the current issues in the building. Rather, it appears that Arbuckle Costic chose a structural engineering team partner who failed to perform appropriately. The available documentation does not, however, document concern on the part of Arbuckle Costic or their project architect in regards to the changes occurring at Century West, or appropriate concern on their part as to the significance of the early deficiencies in the design or initial indicators of problems during construction.

4.0 GEOTECHNICAL ENGINEERING

A component of the process for RFP #10-1002 was a pre-proposal meeting and limited walkthrough of Courthouse Square. The areas of the building visited during this walkthrough suggested that geotechnical issues could be a significant contributing factor to the problems. Upon award of the forensic investigation contract, this was high on our list of priorities for further investigation and early in our assessment process we reviewed the geotechnical reports, excavation documentation, field notes and density testing results. Details regarding the field testing documentation will be presented in our discussion of quality assurance and quality control. The documents reviewed pertinent to our analysis of the geotechnical factors included;

- Century West Report: Geotechnical Investigation, Courthouse Square, Salem, Oregon, dated March 7, 1997
- Century West Report: Addendum #1 Geotechnical Investigation, Courthouse Square, Salem, Oregon, dated August 28, 1998
- Project Plans and Specifications
- Century West Field Observation Reports
- Carlson Testing In-Place Density Tests
- Pence/Kelly Change Order Requests for Over-excavation

Following is the geotechnical review carried out for Courthouse Square by Andrew Walker, PE Golder Associates Inc. (Golder) Principal and Senior Consultant.

4.1 Geotechnical Review

The following comments are made in relation to the geotechnical report carried out by Century West (CW) entitled “Geotechnical Investigation, Courthouse Square, Salem, Oregon” dated March 7, 1997. An addendum to this report providing additional borehole data was issued by Century West on August 28, 1998.

- The report contains standard geotechnical recommendations for such items as bearing capacity, expected settlement and lateral earth pressures. It was anticipated that the foundations would be at least around 10 ft in depth and founded on dense native soils. Fill was only encountered in one borehole.
- An allowable bearing capacity of 6,000 psf was recommended for footings placed on dense native gravelly soils and an allowable bearing capacity of 2,500 psf was provided for footings placed on compacted fill.
- The report seems to be written for an excavation that would have been extended to 20 ft below grade per the original design for the facility. The actually constructed slab on grade was only at about 10 ft below existing grade or at about Elevation 143.2 ft.
- Water proofing was recommended for basement slabs as the recorded water levels ranged from 10 ft to 15 ft below grade. However ground surface elevations have not been provided for the boreholes and therefore the actual range of groundwater level fluctuation in terms of elevation cannot be determined.

- For inspection and testing the report recommends all general and footing excavations should be inspected by the Geotechnical Engineer and all backfill and general fill approved by the Geotechnical Engineer.

4.1.1 Field Reports and Correspondence

The provided field reports and correspondence was reviewed and the following main points were noted.

- An email dated September 29, 1998 from Tim Terich of Century West discusses water issues with the slab-on-grade. The slab under the south southeast corner was to have bentonite water proofing panels and thickened to 6 inches to account for uplift pressures. The SSE corner was expected to be in an area of likely contaminated groundwater. The rest of the slab was to have release valves. (The actual implementation of this solution during construction was not however confirmed.)
- An email dated March 5, 1999 from Tim Terich of Century West CW allows an increase in allowable bearing capacity to 6,000 psf for compacted fill if 1.5 inches clean crushed gravel is used for backfill.
- In a field report dated April 14, 1999, written by Mathew Rogers of Century West the geotechnical site observations were reduced to being part time.
- Based on the field reports, substantial sub-excavation of unsuitable bearing soils took place. The unsuitable soil is typically described as fill. The sub-excavation depth varied, typically from 2 to 3 ft up to 10 ft below base of footing.
- A letter dated July 12, 1999 from Eric Collins of Century West indicates that no more excavation oversight was required despite 10 percent of the mass excavation remained.

4.1.2 Comments

- The geotechnical report and its recommendations are in line with the standard of practice. The increase in bearing capacity for compacted fills is acceptable. The site is generally well suited for spread footing foundations, and there is no indication that long term settlements would be an issue.
- There does not seem to be a clear explanation as to why the borings did not indicate the depth of fill that was actually encountered. The intermittent nature of the inspection makes it difficult to determine if the over excavation was justified in every instance. For example Century West would observe foundation soils prepared for footings or placement of compacted fills but the extent and depth of sub-excavation seems to have been determined by the contractor.
- The use of a pressure relief system to prevent hydrostatic uplift on the slab seems problematic. In addition, contaminated groundwater, if present at one corner of the site, could eventually migrate to the rest of the site and therefore to the relief valves.
- The replacement compacted materials appear to have been compacted properly and therefore the allowable bearing pressure would have been acceptable.

4.1.3 Final Conclusion

- It is unlikely that the building distress is connected to footing settlements. Due to the granular nature of the soils settlement would have occurred primarily during construction and would not have increased significantly with time. However, it is unclear why so much sub-excavation was required and it is possible that future damage to the slab-on-grade could occur if high groundwater levels occur.

5.0 STRUCTURAL ENGINEERING

We have concluded that structural design errors are the critical element in causing the current conditions in the building. This is based on our review of the project documentation and our visual assessment of the structure. As part of our document review process and in accordance with our scope of work, we have read the reports by others who have evaluated Courthouse Square. For our analysis, our review of the project documentation included:

- Century West Structural Drawings, dated Dec.30, 1998
- Arbuckle Costic Architectural Drawings, dated Dec. 30, 1998
- Arbuckle Costic Architects Architectural Specifications Volume I, dated Dec. 30, 1998
- Century West Structural Observation Reports
- Submittals, RFIs, and Change Orders
- Project Communications
- Carlson Testing Field Inspection Reports, Fabrication Shop Reports Concrete Lab Data, and Post-tension Elongation Data.

5.1 Structural Analysis

From the Perbix Bykonen structural analysis memo:

It is our opinion that the critical failure in the design and construction process lay with the original design. The engineer of record appears not to have possessed adequate experience with this building type and/or scale. This resulted in an incomplete set of design documents and a design which contains numerous non-conforming design elements, many of which threaten safety. The engineer of record bears the responsibility for this work.

Todd Perbix's memo, dated May 2, 2011, which contains the complete structural analysis performed by Perbix Bykonen, can be found in Appendix E. The Adapt software structural analysis can be found in Appendix M.

5.1.1 Structural Observation Reports and Communication

Previously referenced Appendix D contains examples of the communication between the design and construction team members regarding the occurrence of problems throughout the project. The root of the problems causing the cracking at the columns appears to have been misunderstood and the significance underestimated. As previously noted, on February 18, 2000 Craig Lewis sent a memo of concern to Leonard Lodder asking for third party evaluation of the cause of the cracking at the top of the columns beneath the bus mall. A response to this request or any subsequent action taken has not been determined. The addition of reinforcing steel is noted but the implications of the need to do so are not discussed. As regards the reported or perceived concrete quality during construction, it was noted by Tim

Terich in a Structural Observation Report dated October 13, 1999 that “Based on the consistent concrete quality to date I told ET (Carlson Testing) that he may test any pour of less than ten yards at his discretion.”

The reports indicate that Tim Terich, accompanied by Leonard Lodder and Steve Schaad, inspected the post tension tendons and reinforcement, particularly before the first pour on each floor. The Carlson Testing reports document the actual concrete placement, inspection for subsequent pours, elongation results, and concrete compressive strength. The process of documenting the strength of early break cylinders as a basis for tensioning the cables can be found in the project files, but the manner in which this information was conveyed to the contractor is not identified.

6.0 CONSTRUCTION PROCESS

The construction process is reasonably well documented in the available Century West and Carlson Testing Reports. Communications between Pence/Kelly and the design team including Submittals, Requests for Information and Change Order Requests are included in the project documentation and appear comprehensive. Examples of the RFIs can be found in Appendix F. What are lacking in the available documentation are field notes recorded by Pence/Kelly during construction. As of the date of this report, these documents have not been available for review.

7.0 PROJECT FINANCES

The budget established for Courthouse Square was $34,000,000. According to a letter sent by Arbuckle Costic Construction to Billy Wasson dated February 16, 1999, they were concerned that the base bid price of $16,625,538 for construction would adversely affect their design fees and requested a re-evaluation of the fees based on a formula provided. The letter is included in Appendix G. At the time, Arbuckle Costic was working under an interim contract and a number of amendments are noted in the project documents. The resolution of the request contained in the letter was not found in the files but a number of subsequent amendments increasing Arbuckle Costic's fees for the project were noted.

The financial relationship between Melvin Mark Companies and Marion County/Salem Area Mass Transit District includes fees prior to the redesign of the facility, the contract for project management services, and subsequent amendments. The base fee for project management was $437,500. The contract negotiated between Marion County/Salem Area Mass Transit District and Pence/Kelly, dated March 5, 1999, is for the amount of $18,459,484. According to the project record, a total of 26 amendments were executed based on Change Order Requests approved during construction with the New Contract Total recorded as $20,899,025.

Century West Engineering contracted with Marion County/Salem Area Mass Transit District on a Work Order basis for geotechnical and environmental services during the demolition and site preparation phases of the project. From the available documentation, it appears that Century West's structural engineering services contract was executed with Arbuckle Costic Architects. Century West continued to work directly for Marion County/Salem Area Mass Transit District on a Work Order basis for geotechnical and environmental services during construction.

Based on the project documentation and file of Change Order Requests, it appears that the financial aspects of the project's construction were proactively managed and controlled by the project team. Relevant to the technical aspects examined as part of our investigation of the current issues, we noted cost overruns associated with overexcavation of the site soils. An example of this occurrence and the associated documentation by Pence/Kelly can be found in Appendix H. As noted previously in the geotechnical report, this overexcavation may have been necessary but documentation and authorization by the designer is lacking.

The project files contain documentation of requests for additional fees by Century West Engineering. These reference code changes in the 1997 Uniform Building Code and requested or required design changes due to programmatic changes in the structure. The response from Leonard Lodder sites the number of RFI's received from Pence/Kelly and "considerable concern that the level of completeness of the structural drawings will expose the Owners to significant additional costs through change orders".

The resolution of the financial conflict between the Architect, Owners and Century West Engineering in regards to these and other issue.

8.0 QUALITY ASSURANCE AND QUALITY CONTROL

The documentation of the construction process from the quality control perspective features Carlson Testing's daily field reports, lab results and supporting documentation. The reports for the structural steel and welding are comprehensive. The in-place density and concrete reports are typical for the industry but lack relevant information; including location information, what specifications were conformed to, and information on the curing of the concrete. The quality assurance reports provided by Century West provide only minimal information and, being periodic, leave gaps in our overall ability to recreate the construction process. It should be noted that budgetary considerations often are responsible for minimal quality assurance on the part of the design team and we are unaware of any documentation regarding what quality assurance role was played by the project manager. The documents examined relevant to the QA/QC process include:

- Century West Project Plans and Specifications
- Century West Geotechnical Field Observation Reports
- Century West Structural Observation Reports
- Carlson Testing Report of In-place Density Tests
- Carlson Testing Soils Laboratory Test Results
- Carlson Testing Field Inspection Reports
- Carlson Testing Concrete Test Results
- Carlson Testing Post-tension Stressing Reports
- Carlson Testing Shop Inspection Reports
- Communications, RFIs and Change Order Requests

8.1 Excavation, Backfill and Compaction Control

The excavation during the construction phase and the placement and compaction of engineered fill was, according to the available documentation, performed by Wadsworth Excavation. The work was periodically inspected by Matt Rogers or Bill Smith of Century West. Carlson Testing provided the compaction control.

As previously noted, the subexcavation was only periodically monitored by Century West personnel and appears to have been largely left to the contractor to manage. While it may be that Pence/Kelly's superintendent or foreman paid close attention to the matter, it would have been in Marion County's best interest to have a designated representative as part of this process. The quantity of the overexcavation is well documented in the project records in terms of the amount and location, but qualifying the extent and necessity would be a strong recommendation on future projects.

Earlier in this report we concluded that the problems at Courthouse Square are likely not attributable to footing settlement. We did note, however, a number of issues in the Carlson Testing moisture-density

(proctor) and in-place density reports that bear mentioning. Laboratory analysis procedures for soil, pit run or crushed materials for compaction control contain numerous subtleties that can ultimately make a difference to the quality of a project. Procedures for lab testing are precise, as are those for testing in the field.

In the case of Courthouse Square, a number of errors occurred in the moisture density testing that call some values used for compaction control into question. These include running tests on material that contains too much oversized (+3/4 in) aggregate, not understanding the relationship between zero air voids and maximum density values, and not creating well spaced moisture increments to generate proctor curves. For the Courthouse Square project we do not consider these errors critical or contributory to the major issues but they did not serve to ensure the quality of the subgrade preparation. Examples of these issues can be found in Appendix J.

We noted that a number of in-place density tests site 90% or 100% as the compaction requirement. As the specification appears to only state 95% for all soils and backfill, and 92% for asphaltic pavement, we are unclear of the source of these requirements. In the field, 100% compaction is highly unrealistic and largely unobtainable. If the laboratory procedure has been run correctly, achieving 100% compaction requires enough compactive effort to break down the component particles in the soil or crushed rock. In this case, if a new proctor was run on the in-situ material, the density requirement would go up and the actual compaction would fall short of the requirement. Appendix K contains a spreadsheet delineating the compaction control testing.

8.2 Concrete Inspection and Testing

The concrete for the project was provided by River-Bend, a ready-mix batch plant in Salem, Oregon. A number of mix designs were submitted and approved by Century West for use. The supporting documentation indicates that the 3,000 psi and 5,000 psi mixes should have reliably reached their respective design strengths. A number of add-mixtures were proposed for the concrete including water reducers, shrinkage reducers, air entrainers and fiber.

The concrete inspection and testing for the project was performed by Carlson Testing's Salem office. It appears from the project documentation that the placement of the reinforcing steel and post-tension tendons was typically inspected by Carlson Testing's certified special inspector ET Williams, though other Carlson Testing personnel were also involved. Structural observation reports indicate that, periodically, Tim Terich observed sections of post tensioned slabs prior to placement and was accompanied by Steve Schaad and Leonard Lodder. Overall, the field inspection reports are representative of industry standards, but occasionally lack information regarding locations inspected or what plans, details and specifications the work conforms to. These reports also lack any information on the concrete curing

practices employed during the project which, given the current issues, could be considered critical information.

According to the available records, concrete placement began in April, 1999 (with the single exception of a recorded placement in February) and was completed in June of 2000. The documentation indicates that the concrete typically met or exceeded design strength and that the actual weight of concrete in the mix frequently exceeded the design requirement. Appendix L contains a record of the available concrete lab reports.

Considerable attention has been paid to the fact that the concrete break data for the cylinders taken during construction does not correlate with the data from recently completed testing of cores taken from the slabs in Courthouse Square. The recent Sera Architects report dated March 14, 2011 contains information provided by both Carlson Testing and Professional Service Industries indicating that the in-situ concrete strengths may average as much as 1,400 psi lower than the required 5,000 psi design strength. The Carlson Testing data recorded during construction indicates that virtually all samples passed the compressive strength requirements. This data is consistent during the project and there is no evidence in the documentation to suggest that the data is not accurate. Though we have seen only a few examples, the batch tickets appear to support the supposition that excessive water was not introduced to the mix. There are certainly ways in which undocumented water could be introduced but, as noted in the Sera report, it could take as much as 100 gallons per 10 yard truck load to change the water/cement ratio from the specified levels to those noted in the petrographic reports and we are unable to determine how this might have occurred.

So while the presence and source of any additional water remains unresolved, the petrography provides clues as to the difference in compressive strength. This pertains to the presence of microcracking noted in virtually all of the cores, as well as the apparent poor bond between the cement paste and aggregate. The American Concrete Institute (ACI) notes that a 15% difference between cylinders cast during construction and cores subsequently taken from the concrete is acceptable. The presence of microcracking in the cored samples is a likely contributor to the fact that the difference in the case of Courthouse Square falls outside the acceptable ACI parameters. With little evidence yet available as to the source of the microcracking, this issue remains unresolved.

It should be noted that sampling of insitu concrete requires that very precise procedures are followed from how the cores are attained to how they are transported, stored, prepared and tested in the compression machine. Supporting data for the recent testing acknowledges these protocols but how closely they were followed would affect the resulting test data. Sampling and testing should have been performed in representative areas throughout the building and bus mall to establish a meaningful baseline data set so conclusions could be drawn about the concrete in the structures. These investigations should have

included nondestructive testing to correlate the core test data with the concrete conditions in the mass of concrete in the slabs. It is possible that the excessive post-tensioning could also have had an adverse affect on the concrete but further investigation of this issue would be required.

We did note in our review of the concrete placement notes that, while the dosage for the admixtures used appears to fall within acceptable parameters, two water reducing admixtures were used in some of the mixes. Based on a recent conversation with a technical representative for the admixture producer, it is our understanding that these admixtures, Pozzolith 200N and Polyheed, are rarely used together. Further, if used near the higher end of their dosage range, this could be problematic regarding the performance of the concrete and could cause segregation of the mix. The data suggests that this could have been the case in some instances. It is also quite possible that poor curing practices may have been a contributing factor, but we do not have evidence that this was the case. At this point our concerns about the condition of the building are increased by the lower concrete strengths, poor cement paste/aggregate bond, and presence of the microcracking. Given the break data for the original cylinders, it may be possible that some of these issues have occurred over time and may be related to the conditions in the slabs or during construction and not the integrity of the concrete delivered to the project.

Further investigation of the concrete may or may not be required based on proposed remediation strategies. We do not presently feel that any concrete issues have been appropriately identified as to their cause and structural implications. If additional testing of the concrete in the slab is undertaken, we recommend that nondestructive testing be included as a component of the program so insitu conditions can be compared to laboratory test results.

8.3 Post Tension Stressing

The project files contain a record of the tendon elongation measurements recorded by Carlson Testing Inspectors. Though we have called these values into question in our evaluation, the record indicates that the specified values were largely achieved. We note that the extent of overstressing might have posed a physical risk onsite but, fortunately, that was not the case. The following is from the Perbix Bykonen report:

PT slab analysis indicates that all directions of each of the selected slabs are highly compressed. The amount of compressive stress exceeds recommended maximums of 300 psi in most cases. In the transverse (north-south) direction, stresses vary between 335 psi and 487 psi. In the longitudinal (east-west) direction stresses vary between 318 psi and 417 psi

The analysis shows that the compressive stress overbalances the slab dead load by between 180% and 250% in the longitudinal direction while only balancing between 50% and 80% in the transverse direction.

The transverse direction, despite its high compressive stresses, balances less dead load because the length of the building in this direction is relatively short and the end spans are long.

These differences in balanced loads account for deflected slab shape as measured in previous investigations. The office slabs are deflecting downward in long spans of the transverse direction while the significant overbalancing in the longitudinal direction causes crowning mid-grid rather than deflection.

8.4 Structural and Reinforcing Steel

The structural steel and welding inspection documentation for the project was found to be very thorough. Notes regarding the addition of rebar during construction are less well documented in the Carlson Testing field reports though other documentation attests to this ongoing occurrence. While the field inspectors may have assumed the presence and involvement of the structural engineer precluded their need to precisely record the details of these additions, the inclusion of this information would have been extremely useful in the project record.

9.0 LESSONS LEARNED

Though certain indicators documented throughout this report may have raised concerns about the Courthouse Square project, it is unlikely that the full implications of the deficiencies in design would have been detected at the time. Steps must be taken to avoid this possibility in the future. Though this project was constructed over 10 years ago, and despite any successful construction programs in the interim, certain quality assurance procedures should be considered for adoption on future Marion County and Salem Area Mass Transit District projects.

9.1 Owner's Representative

When new projects are under consideration, a qualified consultant who is independent of any agencies' involved in the program should be engaged. The role and responsibility of this individual or firm would be to focus on the scope of work for the project, the potential budget, and the advertising for and contracting with the design team and contractor. It is important that all parties agree to make the owner's representative a full partner in the process.

9.2 Competitive Contracting

It is critical that Marion County employ a competitive process for all major development, design and construction projects. This will provide the County with the opportunity to ensure they are getting the most qualified team for the project. Future County review and selection committees should include a technical representative designated to focus on the design and constructability of the project, regardless of any outside consultants contracted in this regard. This role is separate from, but follows on, that of the Owner's Representative and may be undertaken by the Clerk of the Works. The review and selection process should be transparent and the public should be kept informed. All potential conflicts of interest should be studiously avoided.

9.3 Peer Review of Design

The County will benefit from having independent peer review performed of the design of all major projects. This can be part of the Value Engineering process or a standalone exercise. This investment should pay dividends in terms of avoiding the sorts of issues that occurred at Courthouse Square.

9.4 Clerk of the Works

The County needs to ensure it has a technically qualified representative involved throughout the construction process on major projects. Project supervisors and managers often rely on the design team and contractors for technical information while focusing on project finances and logistics. A Clerk of the Works is charged with providing continuous quality assurance, overseeing the quality control function and engaging in an ongoing dialogue with the design team as issues arise. It is critical that the Clerk of the Works has a technical background applicable to the project design and mode of construction, and a direct

line of communication to appropriate Marion County and Salem Mass Transit District personnel that allows for separation of financial and technical considerations; and that the Clerk of the Works focus solely on the latter.

10.0 CLOSING

If you have any questions regarding the contents of this report, please contact us at your convenience.

GOLDER ASSOCIATES INC.

Mark Liebman
Senior Forensic Investigator

Matthew A. Benson, LG
Associate, Geophysics Group Manager

ML/MAB/jbk

APPENDIX A
GOLDER ASSOCIATES INC. WORK PLAN

Work Plan

SCHEDULE FOR COURTHOUSE SQUARE FORENSIC INVESTIGATION SERVICES	Week of January 31st	Week of February 7th & 14th	Week of February 21st	Week of February 28th & March 7th	Week of March 14th, 21st & 28th	Week of April 4th	Week of April 11th	Week of April 18th	Week of April 25th	Week of May 2nd	Week of May 9th, 16th & 23rd
Initial Document Survey Mark Liebman											
Document Review Mark Liebman – *Overall Plans and Specifications* Andrew Walker – *Geotechnical Reports and Field Notes* Todd Perbix – *Structural Plans and Specifications* Alec Liebman – *General Documentation*											
Additional Document Review Mark Liebman – *Submittals, RFI's, Field Notes, Lab Reports, and Interviews With Key Personnel* Alec Liebman – *Communication, Environmental Reports, and Subsequent Investigation Reports* Andrew Walker – *Select Geotechnical Documents* Todd Perbix – *Select Structural Documents*											
Preliminary Analysis Mark Liebman – *Design and Construction Items* Andrew Walker – *Geotechnical Factors* Todd Perbix – *Select Structural Documents*											
Analysis and Report Preparation Mark Liebman – *Design and Construction Items* Andrew Walker – *Geotechnical Factors* Todd Perbix – *Structural Issues*											
Draft Report Provided to Marion County and Salem Mass Transit District											
Review of Draft Report by Marion County and Salem Mass Transit District Personnel											
Meeting With Marion County and Salem Mass Transit District Regarding Draft Report											
Final Report Preparation Mark Liebman – *Final Edits* Andrew Walker – *Input* Todd Perbix – *Input* Alec Liebman - *Input*											
Final Report Provided to Marion County and Salem Mass Transit District											
Meetings with Marion County Committees, and Members of the Community and the Media, or Other Services, As Requested											

Status Memos on the Preliminary Findings will be provided to Marion County staff upon the completion of the following areas of the investigation: Geotechnical Considerations, Structural Design, Material Selection, Construction Activities, and Testing and Inspection Reports.

APPENDIX B
COURTHOUSE SQUARE DOCUMENTS CATALOG

Courthouse Square Documents Catalog

Files Uploaded to Transfer site	1 RecordID	2 Title	3 Company	4 Date	5 Project ID	6 BLDG	7 Discipline	8 Phase	9 Type	10 Document Location	11 Media	12 Pages	13 Size	14 MB
	10299	Corrective Action Plan - Chevron Parcel	Century West Engineering	7-Mar-1994	CS9403	CS		PRECONSTRUCT		SHELF: CS	PAPER		811	
	10300	Level I Environmental Site Assessment Chevron Lot	Bergeson,Boese & Associate	7-Mar-1994	CS9403	CS		PRECONSTRUCT		SHELF: CS	PAPER		811	
	10301	Marion County Master Facilitiy Plan	Marion County	1-Jan-1995	CS9801	CS				SHELF: CS	PAPER		811	
	10302	Development Team Meeting Notes (96-99)	Marion County	1-Jan-1996	CS9801	CS				SHELF: CS	PAPER		811	
	10303	Project Analsis and Feasibility Report	Prudential Commercial Inves	1-Jun-1996	CS9801	CS	FINANCE			SHELF: CS	PAPER		811	
	10304	Environmental Assessment for Transit Center	(COG) Council of Governmer	1-Jun-1996	CS9801	CS	ENVIRON			SHELF: CS	PAPER		811	
	10305	Project Analysis and Feasibility Report	Prudential Commercial Inves	22-Jul-1996	CS9801	CS	FINANCE			SHELF: CS	PAPER		811	
	10306	Estimated Project Cost	Prudential Commercial Inves	30-Dec-1996	CS9801	CS	FINANCE			SHELF: CS	PAPER		811	
	10307	Project Specification Asbestos Abatement	Three Rivers Environmental	1-Jan-1997	CS9702	CS	ENVIRON			SHELF: CS	PAPER		811	
	10308	Compiled Reports	Marion County	1-Jan-1997	CS9801	CS				SHELF: CS	PAPER		811	
	10309	Site Monitoring Pictures	Marion County	1-Jan-1997	CS9801	CS				SHELF: CS	PAPER		811	
	10310	Project Analysis	Prudential Commercial Inves	14-Jan-1997	CS9801	CS	FINANCE			SHELF: CS	PAPER		811	
	10311	Phase I Environmental Assessment	Century West Engineering	4-Feb-1997	CS9701	CS	ENVIRON			SHELF: CS	PAPER		811	
	10312	Asbestos/Lead Survey/Hazard Material Survey (Liu Prop	Century West Engineering	10-Feb-1997	CS9701	CS	ENVIRON			SHELF: CS	PAPER		811	
	10313	Contract Document Information (compiled notebook)	Marion County	1-Mar-1997	CS9801	CS				SHELF: CS	PAPER		811	
X	10021	Geo Technical Report 1997	Century West Engineering	7-Mar-1997	CS9828	CS	GEOTECH	DESIGN	REPORT	DIR:GeoTechnical Report 1997-2008	PDF	64	811	5.8
	10314	Asbestos/Lead Survey/Hazard Material Survey (Beri)	Century West Engineering	11-Mar-1997	CS9701	CS	ENVIRON			SHELF: CS	PAPER		811	
	10049	Asbestos/Lead Survey/Hazard Material Survey (Comm I	Century West Engineering	14-Mar-1997	CS9701	CS	ENVIRON			SHELF: CS	PAPER		811	
	10315	Asbestos/Lead Survey/Hazard Material Survey (Goldber	Century West Engineering	14-Mar-1997	CS9701	CS	ENVIRON			SHELF: CS	PAPER		811	
	10316	Asbestos Abatement & Air Monitoring	Century West Engineering	19-Nov-1997	CS9701	CS	ENVIRON			SHELF: CS	PAPER		811	
	10317	Special Project Oversight Committee (SPOC) Report #1	Marion County	15-Dec-1997	CS9801	CS	GOV			SHELF: CS	PAPER		811	
	10318	Demolition Documents (compiled notebook)	Staton Construction	1-Jan-1998	CS9702	CS	SUB			SHELF: CS	PAPER		811	
	10319	Sub Items: Parking, North Block, Planning (98-99)	Marion County	1-Jan-1998	CS9801	CS	GOV			SHELF: CS	PAPER		811	
	10320	Courthouse Square Notebook	Marion County	1-Jan-1998	CS9801	CS	GOV			SHELF: CS	PAPER		811	
	10321	Courthouse Square Internal Staff Team Minutes	Marion County	1-Jan-1998	CS9801	CS	GOV			SHELF: CS	PAPER		811	
	10322	Courthouse Square Agreements (compiled notebook)	Marion County	1-Jan-1998	CS9801	CS			CONTRACT	SHELF: CS	PAPER		811	
	10323	Courthouse Square Costs (Notebook)	Arbuckle/Costic	1-Jan-1998	CS9801	CS	ARCH			SHELF: CS	PAPER		811	
	10324	Courthous Square Finance Team Report	Prudential Commercial Inves	22-Jan-1998	CS9801	CS	FINANCE			SHELF: CS	PAPER		811	
	10325	Consultation Report	Palmer Grouth & Pietka	3-Feb-1998	CS9801	CS				SHELF: CS	PAPER		811	
	10326	Question and Answers to Issues Courthouse Square	Transit Board	3-Feb-1998	CS9801	CS	GOV			SHELF: CS	PAPER		811	
	10327	Courthouse Square SPOC Agenda -Feb 98	Marion County	24-Feb-1998	CS9801	CS	GOV			SHELF: CS	PAPER		811	
	10328	Underground Storage Tank Decommissioning	Century West Engineering	13-Mar-1998	CS9702	CS	ENVIRON			SHELF: CS	PAPER		811	
	10329	Hazardous Materials Removal Management	Century West Engineering	18-Mar-1998	CS9702	CS	ENVIRON			SHELF: CS	PAPER		811	
	10330	Hazardous Material Removal Management	Century West Engineering	18-Mar-1998	CS9702	CS	ENVIRON			SHELF: CS	PAPER		811	
	10331	PreConstruction Remedial Activity Reprot	Century West Engineering	14-Apr-1998	CS9702	CS	ENVIRON			SHELF: CS	PAPER		811	
	10332	Courthouse Square SPOC Agenda - Arpil 98	Marion County	14-Apr-1998	CS9801	CS	GOV			SHELF: CS	PAPER		811	
	10333	Courthouse Square Subsurface Remediation	Century West Engineering	1-Jun-1998	CS9702	CS	ENVIRON			SHELF: CS	PAPER		811	
	10334	Demolition Report	Century West Engineering	5-Jun-1998	CS9702	CS	SUB	PRECONSTRUCT	REPORT	SHELF: CS	PAPER		811	
	10335	Design Development Construction Cost Estimate	Arbuckle/Costic	21-Aug-1998	CS9801	CS	ARCH	DESIGN	EST	SHELF: CS	PAPER		811	
X	10022	Geo Technical Report 1998 Addendum #1	Century West Engineering	28-Aug-1998	CS9828	CS	GEOTECH	DESIGN	REPORT	DIR:GeoTechnical Report 1997-2008	PDF	11	811	0.8
	10376	Finance Documents (Notebook R.C)	Marion County	1-Oct-1998	CS9828	CS	FINANCE	DESIGN	FINANCE	SHELF: CS	PAPER		811	
	10336	Value Analysis for Salem Transist	Meng Design Research	20-Oct-1998	CS9801	CS	CONSULT	DESIGN	EST	SHELF: CS	PAPER		811	
	10337	Remedial Action Report Construction Phase	Century West Engineering	1-Nov-1998	CS9702	CS	ENVIRON	DESIGN	REPORT	SHELF: CS	PAPER		811	
	10338	Certificate of Participation	Prudential Securities	1-Dec-1998	CS9801	CS	FINANCE	PRECONSTRUCT	REPORT	SHELF: CS	PAPER		811	
	10339	Final Pricing Book Certificate of Participation	Prudential Commercial Inves	16-Dec-1998	CS9801	CS	FINANCE	PRECONSTRUCT	REPORT	SHELF: CS	PAPER		811	
X	10007	Courthouse Square -Elect	Interface Engineering	30-Dec-1998	CS9828	CS	ELECT	DESIGN	DWG	DIR: Abuckle-E	PDF	61	4030	43.9
X	10008	Courthouse Square -Mech	Interface Engineering	30-Dec-1998	CS9828	CS	MECH	DESIGN	DWG	DIR: Abuckle-M	PDF	41	4030	22.2

Courthouse Square Documents Catalog

Files Uploaded to Transfer site	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	RecordID	Title	Company	Date	Project ID	BLDG	Discipline	Phase	Type	Document Location	Media	Pages	Size	MB
	10340	Courthouse Square Specifications - Architectural Vol.1	Arbuckle/Costic	30-Dec-1998	CS9828	CS	ARCH	DESIGN	SPEC	SHELF: CS	PAPER		811	
	10341	Courthouse Square Specifications - Mechanical Vol.2	Arbuckle/Costic	30-Dec-1998	CS9828	CS	ARCH	DESIGN	SPEC	SHELF: CS	PAPER		811	
	10363	Courthouse Square Bid Set #46 Arch/Struct	Arbuckle Costic	30-Dec-1998	CS9828	CD	ARCH,STRUCT	DESIGN	DWG	Flat File: A	PAPER	202	4030	
	10364	Courthouse Square Bid Set #46 Mech/Elect	Arbuckle Costic	30-Dec-1998	CS9828	CD	MECH,ELECT	DESIGN	DWG	Flat File: A	PAPER	102	4030	
	10365	Courthouse Square Bid Set- Arch/Struct (mini)	Arbuckle Costic	30-Dec-1998	CS9828	CD	ARCH,STUCT	DESIGN	DWG	Flat File: A	PAPER	202	2217	
	10366	Courthouse Square Bid Set- Mech/Elect (mini)	Arbuckle Costic	30-Dec-1998	CS9828	CD	MECH,ELECT	DESIGN	DWG	Flat File: A	PAPER	102	2217	
	10052	Alternative Programming Surplus Property	Marion County	1/1/1999	CS9828	CS	GOV	CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10053	Bid Specs: Water Spec/ Supplementary	Arbuckle/Costic	1/1/1999	CS9828	CS	ARCH	CONSTRUCTION	SPEC	FILE CAB: CS	PAPER		811	
	10054	Budget Cost Summary	Arbuckle/Costic	1/1/1999	CS9828	CS	ARCH	CONSTRUCTION	FINANCE	FILE CAB: CS	PAPER		811	
	10055	Certificate for Payment	Arbuckle/Costic	1/1/1999	CS9828	CS	ARCH	CONSTRUCTION	FINANCE	FILE CAB: CS	PAPER		811	
	10056	Certificate of Substaintial Completion	Arbuckle/Costic	1/1/1999	CS9828	CS	ARCH	CONSTRUCTION	CERT	FILE CAB: CS	PAPER		811	
	10057	Change Orders and Log	Arbuckle/Costic	1/1/1999	CS9828	CS	ARCH	CONSTRUCTION	CO	FILE CAB: CS	PAPER		811	
	10058	Construction Project Report/Document	Arbuckle/Costic	1/1/1999	CS9828	CS	ARCH	CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10059	Contracts/Amendments	Arbuckle/Costic	1/1/1999	CS9828	CS	ARCH	CONSTRUCTION	CONT	FILE CAB: CS	PAPER		811	
	10060	Field Observation Reports	Arbuckle/Costic	1/1/1999	CS9828	CS	ARCH	CONSTRUCTION	OBSERV	FILE CAB: CS	PAPER		811	
	10061	Interim Architect Agreement/Contract	Arbuckle/Costic	1/1/1999	CS9828	CS	ARCH	CONSTRUCTION	CONT	FILE CAB: CS	PAPER		811	
	10062	Additional Services	Arbuckle/Costic	1/1/1999	CS9828	CS	ARCH	CONSTRUCTION	CONT	FILE CAB: CS	PAPER		811	
	10063	Site Plan	Arbuckle/Costic	1/1/1999	CS9828	CS	ARCH	CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10064	Structural Observation Report	Arbuckle/Costic	1/1/1999	CS9828	CS	ARCH	CONSTRUCTION	OBSERV	FILE CAB: CS	PAPER		811	
	10065	Arbuckle Subs	Arbuckle/Costic	1/1/1999	CS9828	CS	ARCH	CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10066	Cost Consultants		1/1/1999	CS9828	CS	CONSULT	CONSTRUCTION	ESTIMATE	FILE CAB: CS	PAPER		811	
	10067	ATM Placement Vendor		1/1/1999	CS9828	CS	VENDOR	CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10068	BOC Files (Folders 1-3)	Marion County	1/1/1999	CS9828	CS	GOV	CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10069	Capital Community TV Issues	CCTV	1/1/1999	CS9828	CS	VENDOR	CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10070	Carlson Testing -Contract	Carlson Testing	1/1/1999	CS9828	CS	TEST	CONSTRUCTION	CONT	FILE CAB: CS	PAPER		811	
	10071	Carlson Testing Field Inspection Reports	Carlson Testing	1/1/1999	CS9828	CS	TEST	CONSTRUCTION	INSPECT	FILE CAB: CS	PAPER		811	
	10072	Carlson Testing Miscellaneous	Carlson Testing	1/1/1999	CS9828	CS	TEST	CONSTRUCTION	INSPECT	FILE CAB: CS	PAPER		811	
	10073	Carlson Testing Field Observation Reports	Carlson Testing	1/1/1999	CS9828	CS	TEST	CONSTRUCTION	OBSERV	FILE CAB: CS	PAPER		811	
	10074	Carlson Testing In-place Density Tests	Carlson Testing	1/1/1999	CS9828	CS	TEST	CONSTRUCTION	TEST	FILE CAB: CS	PAPER		811	
	10075	Carlson Testing Shop Inspection Reports	Carlson Testing	1/1/1999	CS9828	CS	TEST	CONSTRUCTION	INSPECT	FILE CAB: CS	PAPER		811	
	10076	Carlson Testing Sieve Analysis Testing	Carlson Testing	1/1/1999	CS9828	CS	TEST	CONSTRUCTION	TEST	FILE CAB: CS	PAPER		811	
	10077	Carlson 5x12 Concrete (Folders 1- 2)	Carlson Testing	1/1/1999	CS9828	CS	TEST	CONSTRUCTION	TEST	FILE CAB: CS	PAPER		811	
	10078	Correspoondence Emails		1/1/1999	CS9828	CS		CONSTRUCTION	NOTES	FILE CAB: CS	PAPER		811	
	10079	Correspoondence Letters		1/1/1999	CS9828	CS		CONSTRUCTION	NOTES	FILE CAB: CS	PAPER		811	
	10080	Cost Sharing Models		1/1/1999	CS9828	CS		CONSTRUCTION	ESTIMATE	FILE CAB: CS	PAPER		811	
	10081	Art Work		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10082	Bidders List		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10083	Business Relations		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10084	Child Care Center		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10085	Commissioning		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10086	Community Forum		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10087	Contracts Miscellaneous		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10088	Ground Breaking Ceremony		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10089	Courthouse Square History Facts		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10090	Courthouse Square Promotion		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10091	Meetings Contractors		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10092	Meetings Demolition		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	

Courthouse Square Documents Catalog

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Files Uploaded to Transfer site	**RecordID**	**Title**	**Company**	**Date**	**Project ID**	**BLDG**	**Discipline**	**Phase**	**Type**	**Document Location**	**Media**	**Pages**	**Size**	**MB**
	10093	Meetings Steering Committee(Folders 1-2)		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10094	Meetings Miscellaneous		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10095	Meetings Handwritten notes		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10096	Meetings Team		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10097	Meetings EMT Workshop		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10098	Rental Rate Study		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10099	Special Reports		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10100	Storage Needs Emails		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10101	Underwriter		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10102	Cisco Systems		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10103	Construction: Certificate of Occupancy		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10104	Construction: Materials		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10105	Construction: Pre-Construction Remedial		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10106	Construction: Request For Proposal		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10107	Construction: Schedule		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10108	Construction: Staton Construction		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10109	Construction: Testing		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10110	DBE Requirements		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10111	Demolition/Abatement Constracts (Folders 1-2)		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10112	Demolition Correspondence		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10113	Department of Energy		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10114	Engineering Interface		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10115	Environmental- Century West Field Observation	Century West Engineering	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10116	Environmental- Century West 1997 - 1998	Century West Engineering	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10117	Environmental- Century West 1998 -1999	Century West Engineering	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10118	Environmental- Century West 1999-	Century West Engineering	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10119	Environmental- Century West (Remedial Action Plan)	Century West Engineering	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10120	Environmental- Constr. Lab Tests and Inspection Services		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10121	Environmental- Department of Environmental Quality		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10122	Environmental- Foss		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10123	Environmental- Geotechnical Resources Incorporated (GRI)		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10124	Environmental- Indoor Environmental Quality (IEQ)		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10125	Enviromnental- Legal		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10126	Environmental- MillerlNash		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10127	Environmental- Miscellaneous		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10128	Environmental- Northwest Deino & Dismantling		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10129	Environmental- Riverbend Landfill		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10130	Environmental- Sewer Main		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10131	Environmental- USA Waste Services		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10132	Facilities- Misc. Documents		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10133	Financial- Account Analysis	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10134	Financial- Allan Brothers Coffee Co. (Previous Tenant)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10135	Financial- Arbuckle Costic Billing	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10136	Financial- Argus Financial Assumptions Model	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10137	Financial- Barker Surveying Co.	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10138	Financial- Benedict, Doug (Previous Tenant)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10139	Financial- Boise Cascade	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	

Courthouse Square Documents Catalog

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Files Uploaded to Transfer site	RecordID	Title	Company	Date	Project ID	BLDG	Discipline	Phase	Type	Document Location	Media	Pages	Size	MB
	10140	Financial- BOMA Reports	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10141	Financial- Capital City Transfer	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10142	Financial- Capital Claims Service	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10143	Financial- Capital Recycling and Disposal	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10144	Financial- Career Network Inc.	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10145	Financial- Carlson Testing	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10146	Financial- Century West (File1-2)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10147	Financial- Arbitrage	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10148	Financial-Bills	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10149	Financial- Budget (1- 2 Files)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10150	Financial- Courthouse Square Inc.	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10151	Financial- Invoices	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10152	Financial- Proforma	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10153	Financial- Revenues	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10154	Financial- Unfunded Budget	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10155	Financial- Clements Parners LLC	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10156	Financial- Closed Material Issue List	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10157	Financial- COPS	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10158	Financial- COPS (Due Diligence Authorizing Resolutions	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10159	Financial- COPS (Insurance Information)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10160	Financial- COPS (Issuance)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10161	Financial- COPS (Official Statement/Drafts)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10162	Financial- Coldwell Banker	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10163	Financial- Comstock, Curt (Previous Tenant)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10164	Financial- Cromwell, Samuel (Previous Tenant)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10165	Financial- CTR Business Systems	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10166	Financial- Cummings/Mayflower	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10167	Financial- Custom Carpet Care	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10168	Financial- Daily Journal ofCommerce	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10169	Financial- Davidson, Wade (previous Tenant)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10170	Financial- Debt Services to CH2	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10171	Financial- Dental Maintenance of Oregon (Property Leas	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10172	Financial- Expenditures Detail	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10173	Financial- Expenditure Summary	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10174	Financial- Expense Reports (Misc.)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10175	Financial- Expenses for Marion County 1995-2001	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10176	Financial- First American Title	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10177	Financial- FY 1995 -FY 1999	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10178	Financial- Foss Environmental Svcs. Co.	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10179	Financial- Functional Journal Entries	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10180	Financial- Furniture	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10181	Financial- Gardiner & Clancy, LLC	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10182	Financial- General Ledger Report	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10183	Financial- Geotechnical Resources Inc.	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10184	Financial- Gillespie Appraisal	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10185	Financial- Hanna, McEldowney & Associates	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10186	Financial- Heinle, Eric (Previous Tenant)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	

Courthouse Square Documents Catalog

Files Uploaded to Transfer site	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	RecordID	Title	Company	Date	Project ID	BLDG	Discipline	Phase	Type	Document Location	Media	Pages	Size	MB
	10187	Financial- Herrmann & Company	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10188	Financial- Ingle, Joshua (previous Tenant)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10189	Financial- Inman, Jennifer (Previous Tenant)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10190	Financial- Interdepartmental Bills (1 - 2 Files)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10191	Financial- Interdepartmental (Facilities Management)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10192	Financial- Interdepartmental Bills (Legal)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10193	Financial- Invoices Misc. (1 - 2 Files)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10194	Financial- Invoice Reports (1 - 4 Files)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10195	Financial- Journal Voucher Reports	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10196	Financial- Ledger Corrections	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10197	Financial- Marion Car Rental	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10198	Financial- Marion Co. Department Relocation	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10199	Financial- Marion Co. Housing Authority	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10200	Financial- Marion County Personnel Services	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10201	Financial- Marion County Remodeling	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10202	Financial- Marion/Salem Data Center	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10203	Financial- Marpo Credit Union (Previous Tenant)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10204	Financial- McCune (Slyter), Anna (Courthouse Coffee S	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10205	Financial- Melvin Mark (Files 1-2)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10206	Financial- MillerlNash	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10207	Financial- Miscellaneous Documents (1-2 files)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10208	Financial- Mission Mill	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10209	Financial- National Rent-a-Fence	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10210	Financial- Norwest (1-2 Files)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10211	Financial- Oregon State DEQ	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10212	Financial- Oregon State Treasury	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10213	Financial- Oregonian Publishing	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10214	Financial- Pacific Info Systems	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10215	Financial- Palmer, Groth & Pietka	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10216	Financial- Pence Kelley	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10217	Financial- Portland Observer	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10218	Financial- Precision Industrial	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10219	Financial- Projected Costs	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10220	Financial- Prudential	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10221	Financial- Purchase Orders (Misc.)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10222	Financial- Revenue Summary	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10223	Financial- Revenues and Expenditures Reports	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10224	Financial- Riverbend Landfill	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10225	Financial- Salem, City of (Streetscape)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10226	Financial- Salem Area MassTransit	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10227	Financial- Salem Area Mass Transit Payments	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10228	Financial- Salem Blue	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10229	Financial- Salem, City of	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10230	Financial- Schenk, Michael (Previous Tenant)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10231	Financial- Skanner Newspaper	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10232	Financial- Standard and Poor's (1-2 Files)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10233	Financial- Staton Construction	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	

Courthouse Square Documents Catalog

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Files Uploaded to Transfer site	**RecordID**	**Title**	**Company**	**Date**	**Project ID**	**BLDG**	**Discipline**	**Phase**	**Type**	**Document Location**	**Media**	**Pages**	**Size**	**MB**
	10234	Financial- Solid Waste	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10235	Financial- Stoel Rives LLP	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10236	Financial- USA & M ofOregon	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10237	Financial- US West	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10238	Financial~ Vandermay Law Firm (Previous Tenant)	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10239	Financial- Waremart	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10240	Financial- Wassom, Billy	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10241	Financial- Xerox	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10242	Financing- Trust Agreement	Marion County	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10243	Floor Plan- Changes		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10244	Interface Engineering- Misc. Documents	Interface Engineering	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10245	Interface Engineering- Site Visit Report	Interface Engineering	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10246	Leasing Agent		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10247	LEED- Miscellaneous		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10248	Legal- Miscellaneous		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10249	Media- Miscellaneous		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10250	Melvin Mark- Construction Plan	Melvin Mark	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10251	Melvin Mark- Misc. Correspondence	Melvin Mark	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10252	Melvin Mark- Change Order Requests Log	Melvin Mark	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10253	Melvin Mark- Contract	Melvin Mark	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10254	Melvin Mark- Proforma	Melvin Mark	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10255	Melvin Mark- Project Management Agreement	Melvin Mark	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10256	Moving- Relocation Issues		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10257	Names of Rooms		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10258	Northblock- Miscellaneous		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10259	Northblock- RFI/RFQ		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10260	Northblock- RFD Drafts		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10261	Northblock- Similar Developments		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10262	Northblock- Task Force Report		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10263	Palmer- Contract		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10264	Parking- Miscellaneous		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10265	Pence Kelley- Bids	Pence/Kelly	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10266	Pence Kelley- Bond	Pence/Kelly	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10267	Pence Kelley- Change Orders (Files 1-3)	Pence/Kelly	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10268	Pence Kelley- Construction Phase	Pence/Kelly	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10269	Pence Kelley- Contract	Pence/Kelly	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10270	Pence Kelley- Contract Amendments	Pence/Kelly	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10271	Pence Kelley- Contract Review Sheet	Pence/Kelly	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10272	Pence Kelley- Misc. Documents	Pence/Kelly	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10273	Pence Kelley- Owner Issue Log	Pence/Kelly	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10274	Pence Kelley- Request for Infonnation Log	Pence/Kelly	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10275	Pence Kelley- Site Work Reports	Pence/Kelly	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10276	Pence Kelley- Value Engineering Requests	Pence/Kelly	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10277	Pence Kelley- Work Schedules	Pence/Kelly	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10278	Personnel- Miscellaneous		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10279	Portland General Electric- Meeting Minutes		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10280	Photography- Clarence LaCrosse Contract		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	

Courthouse Square Documents Catalog

Files Uploaded to Transfer site	1 RecordID	2 Title	3 Company	4 Date	5 Project ID	6 BLDG	7 Discipline	8 Phase	9 Type	10 Document Location	11 Media	12 Pages	13 Size	14 MB
	10281	Property Appraisal- (File 1 - 2)		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10282	Salem, Cityof- Improvement Agreement	City of Salem	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10283	Salem, City of- Inspection Report	City of Salem	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10284	Salem, City of- Intergovernmental Agreement	City of Salem	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10285	Salem, City of- Miscellaneous	City of Salem	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10286	Salem, City of- Permits	City of Salem	1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10287	Security- Miscellaneous		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10288	Space Planning (Departments)		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10289	Time Capsule		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10290	Title Insurance- Miscellaneous		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10291	Transit- Meeting Agenda (12/18/1997)		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10292	Transit- Ground Lease		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10293	Transit- Historical Documents		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10294	Transit- Intergovernmental Agreement		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10295	Transit-Legal Counsel		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10296	Transit- Mall Removal		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10297	Transit- Miscellaneous		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
	10298	Trustee		1/1/1999	CS9828	CS		CONSTRUCTION		FILE CAB: CS	PAPER		811	
X	10017	City of Salem Permit forms	City of Salem	1-Apr-1999	CS9828	CS	GOV	PRECONSTRUCT	PERMIT	DIR:Permit Form-555 Court	PDF	2	811	2.4
X	10018	City of Salem Plans Reviews	City of Salem	1-Apr-1999	CS9828	CS	GOV	PRECONSTRUCT	PERMIT	DIR:Plans-555 Court	PDF	1654	Varies	291
X	10019	City of Salem Structural Calcs	City of Salem	1-Apr-1999	CS9828	CS	GOV	PRECONSTRUCT	CALC	DIR:Structural Calcs and Documents	PDF	1151	811	182
	10038	Geotechnical Field Observation 1999	Century West Engineering	1-Jun-1999	CS9828	CS	GEOTECH	CONSTRUCTION	OBSERV	DIR:GeoDesign	PDF	15	811	0.664
X	10011	City of Salem Structural Inspection	City of Salem	1-Jan-2000	CS9828	CS	GOV	CONSTRUCTION	INSPECT	DIR:Structural Inspections-555 Court	PDF	208	811	5.84
X	10012	City of Salem Correspondense	City of Salem	1-Jan-2000	CS9828	CS	GOV	CONSTRUCTION	NOTES	DIR:Correspooondence-555 Court	PDF	6	811	0.43
X	10013	City of Salem Certificates	City of Salem	1-Jan-2000	CS9828	CS	GOV	CLOSEOUT	CERT	DIR:Certificates-555 Court	PDF	2	811	0.95
X	10014	City of Salem Elect/Mech/Plumbing Inspect	City of Salem	1-Jan-2000	CS9828	CS	GOV	CONSTRUCTION	INSPECT	DIR:EMP Inspections-555 Court	PDF	83	811	2.33
X	10015	City of Salem Final Inspections	City of Salem	1-Jan-2000	CS9828	CS	GOV	CLOSEOUT	INSPECT	DIR:Final Inspections-555 Court	PDF	13	811	0.468
X	10016	City of Salem Inspections	City of Salem	1-Jan-2000	CS9828	CS	GOV	CONSTRUCTION	INSPECT	DIR:Inspections Unspecified-555 Court	PDF	24	811	0.51
	10342	Vehicle Swing Gates OM		15-Jun-2000	CS9828	CS	SUB	CLOSEOUT	OM	SHELF: CS	PAPER		811	
	10343	Operators Manual Courthouse Square Mechanical	Oregon Cascade	1-Aug-2000	CS9828	CS	SUB	CLOSEOUT	OM	SHELF: CS	PAPER		811	
	10344	Owners Manual Book 1	Pence/Kelly	9-Sep-2000	CS9828	CS	GEN	CLOSEOUT	OM	SHELF: CS	PAPER		811	
	10345	Owners Manual Book 2	Pence/Kelly	9-Sep-2000	CS9828	CS	GEN	CLOSEOUT	OM	SHELF: CS	PAPER		811	
	10346	Operators Manual Courthouse Square Electrical	EC Electric	2-Nov-2000	CS9828	CS	SUB	CLOSEOUT	OM	SHELF: CS	PAPER		811	
	10347	Access Control OM	Selectron	28-Dec-2000	CS9828	CS	SUB	CLOSEOUT	OM	SHELF: CS	PAPER		811	
	10362	Fire Sprinkler Operation and Maintenance	Guardian Sprinkler Inc.	1-Jan-2001	CS9828	CS	MECH	CLOSEOUT	OM	SHELF: CS	PAPER	160	811	
X	10009	Courthouse Square Record Drawings	Arbuckle Costic	24-Jan-2001	CS9828	CS	ARCH,CIVIL,LAND	CLOSEOUT	DWG	DIR:CS_Drawings A1-A2 PDF	PDF	69	4030	166
X	10010	Courthouse Square Record Drawings	Arbuckle Costic / Century We	24-Jan-2001	CS9828	CS	ARCH,STRUCT	CLOSEOUT	DWG	DIR:CS_Drawings A3-S8 PDF	PDF	133	4030	131.6
	10367	Courthouse Square Record Drawings Arch/Struct	Arbuckle Costic	24-Jan-2001	CS9828	CS	ARCH,CIVIL,LAND	CLOSEOUT	DWG	CH Maintenance	PAPER		4030	
	10368	Courthouse Square Record Drawings Mech/Elect	Arbuckle Costic	24-Jan-2001	CS9828	CS	MECH,ELECT	CLOSEOUT	DWG	CH Maintenance	PAPER		4030	
	10348	OM Hearing Room Audio	Cascade Sound	14-Feb-2001	CS9828	CS	SUB	CLOSEOUT	OM	SHELF: CS	PAPER		811	
	10349	Balancing Report	Dale Switzer Mech Engineer	27-Feb-2001	CS9828	CS	MECH	CLOSEOUT	REPORT	SHELF: CS	PAPER		811	
	10350	OM CCTV/Video	Salem Fire Alarm	1-Nov-2001	CS9828	CS	SUB	CLOSEOUT	OM	SHELF: CS	PAPER		811	
	10351	Commissioning Report	EESI	1-Dec-2001	CS9828	CS	MECH	CLOSEOUT	REPORT	SHELF: CS	PAPER		811	
X	10023	Environmental Site Assessment- North Block	PSB	1-Aug-2003	CS0801	CS	GEOTECH	RESEARCH	REPORT	DIR:GeoTechnical Report 1997-2008	PDF	5	811	0.219
	10355	Environmental Site Assessment- North Block	PSB	1-Aug-2003	CS0801	CS	GEOTECH	RESEARCH	REPORT	SHELF: CS	PAPER	5	811	
	10359	DEA Evaluation Report 2003	David Evans Associates	16-Sep-2003	CS0301	CS	STRUCT	RESEARCH	REPORT	SHELF: CS	PAPER	16	811	
	10352	Operators Manual Courthouse Square Generator 2	Katolight	1-Oct-2003	CS9828	CS	SUB	CLOSEOUT	OM	SHELF: CS	PAPER		811	

Courthouse Square Documents Catalog

Files Uploaded to Transfer site	1 RecordID	2 Title	3 Company	4 Date	5 Project ID	6 BLDG	7 Discipline	8 Phase	9 Type	10 Document Location	11 Media	12 Pages	13 Size	14 MB
	10353	Operators Manual Courthouse Square Generator 1	Katolight	1-Feb-2004	CS9828	CS	SUB	CLOSEOUT	OM	SHELF: CS	PAPER		811	
X	10029	DEA Structural Evaluation Report 2004	David Evans Associates	18-Mar-2004	CS0912	CS	STRUCT	RESEARCH	REPORT	DIR:Engineers DEA	PDF	4	811	0.212
X	10040	Pictures of Damages	Marion County	1-Jan-2007	CS0912	CS	GOV	RESEARCH	PIC	DIR:PIC Damage 2007-2008	PDF	54	811	15.6
	10001	ARBUCKLE01 -CD	Bullivant	06/12/07	CS0501	CS	LEGAL			DIR: ARBUCKLE DISC	TIFF	7368	Varies	561
	10002	ARBUCKLE02 -CD	Bullivant	06/12/07	CS0501	CS	LEGAL			DIR: ARBUCKLE DISC	TIFF	12445	Varies	569
	10003	ARBUCKLE03 -CD	Bullivant	06/12/07	CS0501	CS	LEGAL			DIR: ARBUCKLE DISC	TIFF	11816	Varies	653
	10004	ARBUCKLE04 -CD	Bullivant	06/12/07	CS0501	CS	LEGAL			DIR: ARBUCKLE DISC	JPG, TIFF	5413	Varies	536
	10005	ARBUCKLE05 -CD	Bullivant	06/12/07	CS0501	CS	LEGAL			DIR: ARBUCKLE DISC	JPG, TIFF	6349	Varies	531
	10006	ARBUCKLE05 -CD	Bullivant	12-Jun-2007	CS0501	CS	LEGAL			DIR: ARBUCKLE DISC	TIFF	645	Varies	569
X	10031	DEA Slab Design Review	David Evans Associates	30-Jul-2007	CS0912	CS	STRUCT	RESEARCH	REPORT	DIR:Engineers DEA	PDF	48	811	9.7
X	10020	Project Manual	Arbuckle/Costic	1-Jan-2008	CS9828	CS	ARCH,MECH	DESIGN	SPEC	DIR:CS-Specifications 1998	PDF	1150	811	20.8
X	10027	DEA Structural Evaluation Report 2008 DRAFT	David Evans Associates	1-Jan-2008	CS0912	CS	STRUCT	RESEARCH	REPORT	DIR:Engineers DEA	PDF	17	811	0.548
X	10030	DEA Structural Evaluation Report 2008	David Evans Associates	1-Feb-2008	CS0912	CS	STRUCT	RESEARCH	REPORT	DIR:Engineers DEA	PDF	161	811	8.2
	10358	DEA Structural Evaluation Report 2008	David Evans Associates	1-Feb-2008	CS0912	CS	STRUCT	RESEARCH	REPORT	SHELF: CS	PAPER	161	811	
	10360	Project Manual Teanant Improvements	Carlson Veit Architects	15-Feb-2008	CS0801	CS	ARCH	DESIGN	SPEC	SHELF: CS	PAPER	156	811	
	10042	Pictures Building Settlement	Marion County	5-Mar-2008	CS0912	CS	GOV	RESEARCH	PIC	DIR:CS Photos/CS Builiding Settlement 3	JPG	94		100
	10361	Operation Manual and Submittals	Bainbdridge	1-Jul-2008	CS0801	CS	INTERIOR	CLOSEOUT	SUB	SHELF: CS	PAPER		811	
	10354	Courthouse Square Tenant Improvement Owners Manu	RH Construction	29-Sep-2008	CS0802	CS	GEN	CLOSEOUT	OM	SHELF: CS	PAPER		811	
X	10032	Review of Post-Tensioned Concrete Slab System	M.R.Richards Engineering IN	1-Jan-2009	CS0912	CS	STRUCT	RESEARCH	REPORT	DIR:Engineers M R Richards Report	PDF	4	811	0.165
	10043	Pictures Damage in Parking area	Marion County	1-Jan-2009	CS0912	CS	GOV	RESEARCH	PIC	DIR:CS Photos/CS Damage Parking		70		9.7
	10044	Pictures Damages	Marion County	1-Jan-2009	CS0912	CS	GOV	RESEARCH	PIC	DIR:CS Photos/CS Interior Damages	JPG	428		433
X	10028	DEA Structural Evaluation Report 2009	David Evans Associates	24-Apr-2009	CS0912	CS	STRUCT	RESEARCH	REPORT	DIR:Engineers DEA	PDF	341	811	10.3
X	10026	DEA Quarterly Monitoring 2009	David Evans Associates	15-Jun-2009	CS0912	CS	STRUCT	RESEARCH	REPORT	DIR:Engineers DEA	PDF		811	
	10039	Remediation Project Meeting Notes	SERA	22-Oct-2009	CS0912	CS	ARCH	RESEARCH	NOTES	DIR:Meeting Notes	PDF	60	811	7.7
X	10033	Miller Engineering Report 2009	Miller Consulting Engineers,	30-Oct-2009	CS0912	CS	STRUCT	RESEARCH	REPORT	DIR: Miller Engineering Report	PDF	6	811	2.1
X	10036	Estimates for Litigation 2008-2009	sd Deacon	28-Nov-2009	CS0912	CS	GEN	RESEARCH	ESTIMATE	DIR: sd DDEACON Esitmate for Litigation	PDF	63	811	14.3
	10045	Design Team RFP	Marion County	14-Dec-2009	CS0912	CS	GOV	PROCUREMENT	RFP	DIR:RFP Arch-Engineer	PDF	358	811	88.5
	10046	Geotechnical IRFP	Marion County	11-Jan-2010	CS0912	CS	GOV	PROCUREMENT	RFP	DIR:IRFP Geotech	PDF	29	811	17.7
	10047	CMGC RFP	Marion County	19-Feb-2010	CS0912	CS	GOV	PROCUREMENT	RFP	DIR:RFP CMGC	PDF	160	811	11.3
	10024	Remediation- Building Survey	Marion County	24-Mar-2010	CS0912	CS	CIVIL	RESEARCH	RFQ	DIR:Building Survey	PDF	50	811	16.1
	10025	Building Survey May 2010	David Evans Associates	4-May-2010	CS0912	CS	CIVIL	RESEARCH	REPORT	SHELF: CS	PAPER	48	811	
	10357	Building Survey May 2010	David Evans Associates	4-May-2010	CS0912	CS	CIVIL	RESEARCH	REPORT	SHELF: CS	PAPER	48	811	
	10369	Concrete Cores 10-0607	Carlson Testing	24-May-2010	CS0912	CS	TEST	RESEARCH	TEST	DIR:CS_Carlson Testing Report	PDF	10	811	1.5
	10035	Hygiene Report	WiseSteps	7-Jun-2010	CS0912	CS	ENVIRON	RESEARCH	REPORT	DIR Environmental - Wise Steps	PDF	3	811	0.335
	10037	Geotechnical Report 2010	Geo Design	14-Jun-2010	CS0912	CS	GEOTECH	RESEARCH	REPORT	DIR:GeoDesign	PDF	130	811	12.2
X	10041	Pictures of Discovery Phase 2010	Marion County	24-Jun-2010	CS0912	CS	GOV	RESEARCH	PIC	DIR:PIC Damage 2007-2008	JPG	114	811	105.3
	10048	CS Remediation Report July 2010	SERA	26-Jul-2010	CS0912	CS	ARCH	RESEARCH	REPORT	DIR:SERA	PDF	150	811	14.9
	10371	Petrographic 10-0720	Carlson Testing	29-Jul-2010	CS0912	CS	TEST	RESEARCH	TEST	DIR:CS_Carlson Testing Report	PDF	9	811	0.98
X	10034	Peer Review KGA Letter		1-Aug-2010	CS0912	CS	STRUCT	RESEARCH	REPORT	DIR: Miller Engineering Report	PDF	16	811	4.6
	10356	Geotechnical Report 2010	Geo Design	12-Aug-2010	CS0912	CS	GEOTECH	RESEARCH	REPORT	SHELF: CS	PAPER	130	811	
	10050	PSI Testing - Discovery Phase	PSI Enviornmental	1-Sep-2010	CS0912	CS	TEST	RESEARCH	REPORT					
	10051	Building Survey September 2010	David Evans Associates	1-Sep-2010	CS0912	CS	CIVIL	RESEARCH	REPORT	DIR:DEA Building Survey	PDF	41	811	3.42
	10374	Tendon Drape Appendix C	Carlson Testing	1-Sep-2010	CS0912	CS	TEST	RESEARCH	TEST	DIR:CS_Carlson Testing Report	PDF	14	811	6.75
	10370	Bus Mall Cores 10-0702	Carlson Testing	8-Sep-2010	CS0912	CS	TEST	RESEARCH	TEST	DIR:CS_Carlson Testing Report	PDF	2	811	0.366
	10372	Shearwall Column 10-0916	Carlson Testing	16-Sep-2010	CS0912	CS	TEST	RESEARCH	TEST	DIR:CS_Carlson Testing Report	PDF	15	811	4.47
	10373	Petrographic 10-0927	Carlson Testing	27-Sep-2010	CS0912	CS	TEST	RESEARCH	TEST	DIR:CS_Carlson Testing Report	PDF	25	811	2.99
	10375	Petrographic Examination 10-1215 CTL	Carlson Testing/CTL Group	15-Dec-2010	CS0912	CS	TEST	RESEARCH	TEST	DIR:CS_Carlson Testing Report	PDF	29	811	1.77

Courthouse Square Documents Catalog

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Files Uploaded to Transfer site	**RecordID**	**Title**	**Company**	**Date**	**Project ID**	**BLDG**	**Discipline**	**Phase**	**Type**	**Document Location**	**Media**	**Pages**	**Size**	**MB**

APPENDIX C
DESIGN COMMUNICATIONS

CENTURY WEST
ENGINEERING CORPORATION
LEADING THROUGH EFFECTIVE SOLUTIONS

FAX TRANSMITTAL

Date: November 6, 1998
# of Pages: 3 (Including Cover Page)
Original will follow: N

To: Leonard Lodder,
Arbuckle Costic Architects
Fax #: (503) 581-3655
From: Tim Terich
Project #: 4090300104
Subject: Courthouse Square - Shearwall thickness

Comments:

Leonard,

We have run into a snag with the new seismic requirements in the 1997 UBC. The minimum thickness of shearwalls has been increased. For this reason, I need to thicken all walls that are over 27 feet to twenty inches thick. Currently, we are indicating 18" thickness at these walls. I apologize for this late discovery, I hope that these additional 2" are not too much of a headache. Please call me to discuss after you have reviewed the attached sketches.

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone: (503) 231-6078 Fax: (503) 231-6282

G:\SHARE\PORTLAND\STRUCTURE\OPEN\4090\300104\LENFAX.WPD

9828.CD

ARBUCKLE COSTIC ARCHITECTS, INC.
363 State Street
Salem, Oregon 97301-3533
(503) 581-4114, Fax (503) 581-3655, E-mail acarch@open org

FAX TRANSMITTAL

TO:	Tim Terich Century West Engineering Corporation 825 NE Multnomah, Suite 425 Portland, Oregon 97232	DATE:	January 25, 1999
		JOB NUMBER	9828
		RE:	Courthouse Square
FAX NO.	503 231 6482	NO OF PAGES (including this page)	4
ORIGINAL BY MAIL:	Yes _____		No X

COMMENTS:

These are additional column issues that need to be resolved. Is there a need for a supplementary column schedule?

I also need some response on the substitution requests I sent through.

cc:

By Leonard Lodder, A.I.A.

Please call us if you have any questions on the document(s) or if there are any pages missing

File No 9828-3D

CENTURY WEST
ENGINEERING CORPORATION

LEADING THROUGH EFFECTIVE SOLUTIONS

FAX MEMORANDUM

Date: March 26, 1999
# of Pages: 5 (Including Cover Page)
Original will follow: N

To: Leonard Lodder,
Arbuckle Costic Architects, Inc.
Fax #: (503) 581-3655
From: Tim Terich
Project #: 40903.001.04-7000
Subject: Shearwall dimensions

Comments:

Leonard, we think we have the shearwall dimensions corrected, please review quickly and let me know if it looks good.

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone: (503) 231-6078 Fax: (503) 231-6482

9828.3D

ARBUCKLE COSTIC ARCHITECTS, INC.
363 State Street
Salem, Oregon 97301-3533
(503) 581-4114, Fax (503) 581-3655, E-mail: acarch@open org

FAX TRANSMITTAL

TO·	Tim Terich, P E Century West Engineering Corporation 825 NE Multnomah, Suite 425 Portland, Oregon 97232	DATE.	March 27, 1999
		JOB NUMBER·	9828
		RE:	Courthouse Square
FAX NO	503 231 6482	NO OF PAGES (including this page)	5
ORIGINAL BY MAIL:	Yes _____		No X

COMMENTS:

I have checked the dimensions and noted the corrections I discovered that one of our drafters may have dimensioned the wrong elements. But the base drawing which you received would still be physically correct

cc.

By: Leonard Lodder, A I A

Please call us if you have any questions on the document(s) or if there are any pages missing

File No 9828-3D

PENCE/KELLY
CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8681 Fax (503) 585-7477
CCB # 63435

Request for Information

TO: Leonard Lodder

Arbuckle Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

RFI No. 00119

DATE: 3/31/99

JOB: 99006

ISSUE No.:

Project: Courthouse Square

Subject: Column C-17

Please process and return by no later than 4/7/99

Question	Spec. Ref.	Dwg. Ref. #

On sheet S2.1.1, at grids C-10 and N-10. Please verify if the size of C-17 column is correct. (Column goes from Parking Floor to the Roof.)

Signed: John Gremmels

Response	By:	Firm:	Date:

By: _____ Date: _____

CC:
Pro Management Systems, Inc

ACA011538

PENCE/KELLY
CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8681 Fax (503) 585-7477
CCB # 63436

Request for Information

TO: Leonard Lodder

Arbuckle Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

RFI No. 00120

DATE: 3/31/99

JOB: 99006

ISSUE No.:

Project: Courthouse Square

Subject: Column C-22

Please process and return by no later than 4/7/99

Question	Spec. Ref.	Dwg. Ref. #

Columns on grid 0-10 on Sheet S2.1.1 are called out as C-22 Columns. Schedule shows columns stopping @ the Parking Floor. Please verify. (Columns goes from ground floor to the Roof.)

Signed: John Gremmels

Response	By:	Firm:	Date:

By: _____ Date: _____

CC:

Pro Management Systems, Inc

PENCE/KELLY
CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 389-7223
Portland (503) 224-8681 Fax (503) 585-7477
CCB # 63436

Request for Information

TO: Leonard Lodder
Arbuckle Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

RFI No. 00162
DATE: 4/15/99
JOB: 99006
ISSUE No.:

Project: Courthouse Square
Subject: Columns @ grids 10A &12A, D-N
Please process and return by no later than 4/22/99

Question **Spec. Ref.** **Dwg. Ref. #** S2.3.1

Columns appear @ grids 10A &12A, D-N, ground floor to 2nd floor, on sheets S2.3.1, the column schedules calls for those columns to end at the ground floor. Please clarify. See A2.3.1

Signed: John Gremmels

Response **By:** **Firm:**

Date:

THESE COLUMNS DO NOT SHOW UP ON GROUND FLOOR.
TIM PLEASE CONFIRM.

Upon receipt of this RFI you must notify Pence/Kelly within 2 days, whether the RFI is a no cost change, or an extra to your contract. Additional costs must be submitted within 10, days of receipt.

By: _____ **Date:** _____

CC:

PENCE/KELLY
CONSTRUCTION, INC.

2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8681 Fax (503) 585-7477
CCB # 63435

Request for Information

TO: Leonard Lodder
Arbuckle Costic Architects
363 State Street S.E
Salem, OR 97301-3533

RFI No. 00163

DATE: 4/15/99

JOB: 99006

ISSUE No.:

Project: Courthouse Square

Subject: Columns @ grids 10A &12A, O-line

Please process and return by no later than 4/22/99

Question

Spec. Ref.

Dwg. Ref. # S2.2.1

C16 columns appear @ grids 10A &12A, O-line, ground floor to 2nd floor, 2.3.1, see sheet A2.2.1. Do these columns reach the 2nd flr slab and if so please provide schedule.

Signed: John Gremmels

Response

By:

Firm:

Date:

Upon receipt of this RFI you must notify Pence/Kelly within 2 days, whether the RFI is a no cost change, or an extra to your contract. Additional costs must be submitted within 10, days of receipt

By: _____ **Date:** _____

CC:

ARBUCKLE COSTIC ARCHITECTS, INC.
363 State Street
Salem, Oregon 97301-3533
(503) 581-4114, Fax (503) 581-3655, E-mail: acarch@open org

FAX TRANSMITTAL

TO	Tim Terich, P E Century West Engineering Corporation 825 NE Multnomah, Suite 425 Portland, Oregon 97232	DATE	April 19, 1999
		JOB NUMBER	9828
		RE:	Courthouse Square
FAX NO	503 231 6482	NO. OF PAGES (including this page)	3
ORIGINAL BY MAIL:	Yes _____		No X

COMMENTS

Attached R F I s 162 and 163

Tim, I think a lot of these R F I.s would go away if we issued a revised Column Schedule.

cc

By Leonard Lodder, A I A

Please call us if you have any questions on the document(s) or if there are any pages missing

File No 9828-3D

APPENDIX D
CONSTRUCTION COMMUNICATIONS

Sent By: PENCE KELLY; 503 364 5383; Jun-9-99 16:15; Page 1/1
To: Arbuckle Costic At: 581[redacted]5

PENCE/KELLY
CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8881 Fax (503) 585-7477
CCB # 69435

Request for Information

TO: Leonard Lodder
Arbuckle Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

RFI No. 00255
DATE: 6/9/99
JOB: 99006
ISSUE No.:

Project: Courthouse Square
Subject: Add #3 Bands @ Top of Column 9A-3B
Please process and return by no later than 6/16/99

Question

Spec. Ref.

Dwg. Ref. # S2.1.1

Please confirm phone conversation with Tim Terrich, to add 3 #3 bands @ 3" o.c. at the top of columns from grid 9A to 3B.

Signed: John Grammels

Response

By: **Firm:** **Date:**

Upon receipt of this RFI you must notify Pence/Kelly within 2 days, whether the RFI is a no cost change, or an extra to your contract. Additional costs must be submitted within 10, days of receipt.

By: _____ **Date:** _____

CC:

PENCE/KELLY
CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8681 Fax (503) 585-7477
CCB # 63438

Meeting Minutes
No. 22

Project Manager: Dave Hays

ITEM	DESCRIPTION	STATUS	START	DUE	BALL IN COURT	
D00.00		OLD	4/14/99		Pence/Kelly Construction, Inc.	JG
	CIVIL CONCERNS					
D19.01		CLO	8/19/99		Pence/Kelly Construction, Inc.	SS
	Billy wants to close out all excavation issues. P/K will move storage box and dig up last of overex. 9/2/99 - Contaminated COR has been issued. COR on over ex next week. 9/10/99 - COR 102 has been submitted					
E00.00		OLD	4/14/99		Pence/Kelly Construction, Inc.	JG
	STRUCTURAL CONCERNS					
E13.02		OLD	7/8/99		Arbuckle Costic Architects	LL
	Arbuckle/Costic will get a letter from Century West assuring that Tim Terrich will be available to finish the project and that liability for the structural engineering of the project remains with them. 9/2/99 - Arbuckle is withholding money to get answer. 9/9/99 - Billy wants the same letter from Arbuckle Costic.					
E15.02		OLD	7/22/99		Pence/Kelly Construction, Inc.	JG
	Tim Terrich has added large amounts of rebar and P.T. cables. Pence/Kelly may ask for additional time related to this increased work. 8/12/99 - P/K will request one day per pour for the added rebar. Time will be requested with COR for added P.T. cables.					
E18.01		CLO	8/12/99		Pence/Kelly Construction, Inc.	JG
	P/K will find out how many extra conductors are provided in the travelling cable of the elevator for the security system. Leonard will check with the elevator inspector on the requirements for a beam. 8/26/99 - The traveling cable has 10% extra capacity. Bob will provide requirements for future capacity. 9/2/99 - Need to find out how many pairs the elevator people provide. 9/2/99 - Bob gave us a count of four pair.					
F00.00		OLD	4/14/99		Pence/Kelly Construction, Inc.	JG
	ARCHITECTURAL CONCERNS					
F05.01		OLD	5/6/99		Arbuckle Costic Architects	LL
	Dave is concerned with water penetration through the elevated building slab at the TOD site. Cars parked beneath may be damaged by minerals leached from the slab. 6/3/99 - Billy says that it will probably be 2-3 years before the pad is developed and it will have pedestrian traffic. John has confirm this with the Transit Board. 8/12/99 - Awaiting a PR on this issue. Side walk and deck changes are needed by January 2000. 8/26/99 - PR will be for a pedestrian type deck and will address drainage of the slab. 9/2/99 - PR to be issued 9/3/99.					

CENTURY WEST
ENGINEERING CORPORATION

LEADING THROUGH EFFECTIVE SOLUTIONS

FAX TRANSMITTAL

Date: July 22, 1999
# of Pages: 3 (Including Cover Page)
Original will follow: No

To: Steve Schaad, P / K. — Fax #:(503) 364-5382
Leonard Lodder, Arbuckle Costic — Fax #:(503) 581-3655
From: Tim Terich
Project #: 40903.001.04-7000
Subject: Courthouse Sq.

Comments:

Attached is a re-design of reinforcing near the west shear wall to account for removal of "short" tendons. I have also added reinforcing in the slab area near the west end of the ramp to account for the short tendons - which will stay in this location. Please call if you have any questions.

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone: (503) 231-6078 Fax: (503) 231-6482 G:\SHARE\PORTLAND\STRUCTURI\OPEN\40903\001\04\RFI\FIELDFAX.WPD

9828.3D

Kim Arbuckle, AIA
Alan E. Costic, AIA
Walter E. Bensman, Jr., AIA
Clayton Vorse, AIA
Richard S. Rothweiler, AIA

ARBUCKLE COSTIC ARCHITECTS, INC.
363 State Street
Salem, OR 97301-3533
503/581-4114 Fax: 503/581-3655

July 26, 1999

Glen Cook, P.E.
Executive Vice President
Century West Engineering Corporation
549 SW Mill View Way
Bend, Oregon 97702

RE: Contract for Structural Engineering Services
Courthouse Square, Salem, Oregon
Project No. 9828

Dear Glen:

On June 30, 1999, we were verbally informed by Tim Terich that he and Jason Dhanens were leaving Century West Engineering Corporation to commence comparable positions with Tim R. Froelich Consulting Engineers, Inc. Tim indicated in conversation that this change would be transparent to us since he would continue to service the project as an employee of Century West Engineering Corporation.

This change is a matter of significant concern to us. In January we were informed of the departure of Mike Hayford as the Structural Engineer of Record. Tim Terich as a replacement of Mike Hayford was acceptable to us since Tim had been involved with the project from the beginning, and he assured us that when needed, we could get intermittent access to Mike Hayford through Century West. With the departure of Tim Terich and Jason Dhanens, we understand that Century West no longer maintains a full-time structural engineering department.

Since the Construction Review/Contract Administration portion of your agreement for service on this project is now only partially complete, we would appreciate a letter indicating arrangements made with Tim Terich which will ensure that structural engineering representation for construction review will continue seamlessly, for the duration of the project.

Sincerely,

Leonard Lodder, A.I.A.
Architect

LL:gnv

cc: Craig Lewis, Melvin Mark Development Company
Billy Wasson, Marion County
John Whittington, Salem Area Mass Transit
Tim Terich, Century West Engineering

9828.1B

PENCE/KELLY
CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8681 Fax (503) 585-7477
CCB # 63435

Change Order Request

TO: Craig Lewis
Melvin Mark Companies
111 Southwest Columbia
Portland, OR 97201

COR No: 00107
DATE: 9/20/99
JOB: 99006
ISSUE: 00174

Project: Courthouse Square
COR Title: added PT at ramp

1. Contract time being extended ( ) Calendar days.
2. Acceptance of COR prior to our deadline date of (9/27/99)

For work described below, we offer the following quotation.

Provide additional PT cables and reinforcing adjustments for the "unsupported" area @ grid M/10b, also modify profile of banded PT at ramp per Tim Terich fax dated 7/30/99.

Total Cost: $475

Accepted By: _____ Pence/Kelly Construction, Inc. - Dave Hays
Date: 9/20/99

Reviewed By: _____ Melvin Mark Companies - Craig Lewis
Date:

Accepted By: _____ Salem Area Transit - John Wittington
Date: _____

Accepted By: _____ Marion County - Billy Wasson
Date: _____

Pro Management Systems, Inc.

ACA025040

PENCE/KELLY
CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8681 Fax (503) 585-7477
CCB # 63436

BUCKLE CO
SEP 2 4 1999

Change Order Request

TO: Craig Lewis
Melvin Mark Companies
111 Southwest Columbia
Portland, OR 97201

COR No. 00110
DATE: 9/22/99
JOB: 99006
ISSUE: 00215

Project: Courthouse Square
COR Title: Additional rebar per 3F1 shop dwg.

1. Contract time being extended ( ) Calendar days.
2. Acceptance of COR prior to our deadline date of (9/29/99)

For work described below, we offer the following quotation.

Provide additional reinforcing at the 3rd, 4th and 5th floor slabs per Tim Terich shop drawing review. Reference reinforcing shop drawings 3F1, 4F1 and 5F1

Total Cost: $7,192

Accepted By: _____ Pence/Kelly Construction, Inc - Dave Hays
Date: 9/27/99

Reviewed By: _____ Melvin Mark Companies - Craig Lewis
Date:

Accepted By: _____ Salem Area Transit - John Wittington
Date: _____

Accepted By: _____ Marion County - Billy Wasson
Date: _____

Pro Management Systems Inc

ACA012023

ARBUCKLE COSTIC ARCHITECTS, INC.
363 State Street
Salem, Oregon 97301-3533
(503) 581-4114, Fax (503) 581-3655, E-mail: acarch@open.org

FIELD OBSERVATION REPORT

PROJECT:	Courthouse Square	JOB NO.	9828
DATE:	September 27, 1999	REPORT NO.	6
PRESENT AT SITE:	Steve Schaad, and Leonard Lodder		

1. Trades working at the site include, iron workers (reinforcing) concrete forming, cold formed metal framing, plumbing, HVAC, electrical, etc.

2. Steve showed a condition at Grid Line 12-B and 13-B where arcade beams had pulled away from the supporting concrete "C" sections, probably as a result of stressing the tendons in the second floor slab, Steve has contacted Tim Terich regarding remodel action required..

3. Installation of metal framing and sheathing around columns was underway.

By: Leonard Lodder, A.I.A.

cc: [redacted]
Pence/Kelly Construction
Craig Lewis, Melvin Marks Development Company
Century West Engineering
Interface Engineering
Westech Engineering
File

This confirms and records our interpretation of the discussions which occurred and our understanding reached during this meeting. Please notify in writing within seven days of the date indicated above if the interpretation or description is incomplete or inaccurate.

CENTURY WEST
ENGINEERING CORPORATION

LEADING THROUGH EFFECTIVE SOLUTIONS

STRUCTURAL OBSERVATION REPORT

Date: October 1, 1999
Project name: Courthouse Square
Project #: 40095.009.05-4200
Weather: Clear, 70 degrees

To: Leonard Lodder - Arbuckle Costic Architects
From: Tim Terich - Century West Engineering Corp.

Met onsite with Steve Schaad and Leonard Lodder to inspect the third floor post-tensioning and reinforcing. All pt and reinforcing appears to be installed per plans. Met with E.T. Williams of Carslon Testing to discuss pour for the following Monday. No significant modification to the pt or reinforcing are necessary.

Observed minor cracking in concrete beams at south west corner of project. Interface of beam and airshaft wall is slightly cracked due to concrete shrinkage. I directed Steve to epoxy inject the cracking. The cracking presents no significant strength loss in the assembly.

Time arrived: 12:00p
Time Left Job: 2:30p

Structural Observation by:
Century West Engineering Corp.
Timothy T. Terich, P.E.

cc: Steve Schaad - Pence Kelly Construction
file

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone: (503) 231-6078 Fax: (503) 231-6482

N:\SHARE\PORTLAND\STRUCTURE\OPEN\40095\OBSERV\100199.doc

PENCE/KELLY
CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8681 Fax (503) 585-7477
CCB # 63435

Change Order Request

TO: Craig Lewis
Melvin Mark Companies
111 Southwest Columbia
Portland, OR 97201

COR No. 00115
DATE: 9/30/99
JOB: 99006
ISSUE: 00158

Project: Courthouse Square
COR Title: Added PT at ground floor pour strip

1. Contract time being extended (8) Calendar days.
2. Acceptance of COR prior to our deadline date of (10/7/99)

For work described below, we offer the following quotation.

Provide added PT cables at ground floor pour joints per corrected shop drawings (pours GB & GA2).

Total Cost: $3,532

Accepted By: _____
Pence/Kelly Construction, Inc - John Gremmels
Date: 9/30/99

Reviewed By: _____
Melvin Mark Companies - Craig Lewis
Date:

Accepted By: _____
Salem Area Transit - John Wittington
Date: _____

Accepted By: _____
Marion County - Billy Wasson
Date: _____

ACA012018

CENTURY WEST
ENGINEERING CORPORATION
LEADING THROUGH EFFECTIVE SOLUTIONS

Date: November 12, 1999
To: Leonard Lodder, Arbuckle Costic
From: Tim Terich
Project #: 40903.001.04 - 7000
Subject: Courthouse Square – busmall deck

At your request we have evaluated the design changes to the busmall deck.

1) The proposed change to a paver system.
2) Connection of the island topping slabs to the structural deck
3) Evaluation of the new pour sequencing and elimination of pour strips per P/K's request.
4) Perfrom a final review of the structural system, verify design critera.

FCE TIGARD

We have increased the amount of rebar and post-tensioning tendons at the endbays This addition is necessary to control slab deflections. Shearhead reinforcing has been added at the columns along grid 6.5. The selection of the paver system has slightly increased the dead loads on the slab.

We have provided details to tie the topping slab to the structural slab. We recommend adding light reinforcing to the topping slab as shown for shrinkage-crack reinforcing – it is not for structural performance.

We have provided a detail to accommodate the option to remove the pour strips and allow intermediate stressing of the busmall.

The busmall has been designed to support the loading of the transit busses – including the pedestrian traffic and bus parking stalls.

Please call me with any questions or comments.

Regards,

Timothy T. Terich, P.E.
Project Manager

C:\TIM\CT2\BUSMALL.DOC

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone. (503) 231-6078 Fax: (503) 231-6482

CENTURY WEST
ENGINEERING CORPORATION
LEADING THROUGH EFFECTIVE SOLUTIONS

STRUCTURAL OBSERVATION REPORT

Date: November 15, 1999
Project name: Courthouse Square
Weather: Clear, 63 F
Project #: 40903.001.04-7000

To: Leonard Lodder – Arbuckle Costic Architects
From: Tim Terich, P.E. – Century West Engineering

Met on site with Steve Schaad – Pence Kelly Construction to observe post-tensioned tendon and rebar placement at the east pour of the t[th] floor. Tendons and rebar were approximately 95% complete. Rebar and tendon layout appeared to be installed per plan. Additional shear reinforcing needed to be placed in the shearhead at column K-11.

Time arrived: 1:30p
Time Left Job: 2:45p

Structural Observation by:
Century West Engineering Corp.
Tim Terich, P.E.

cc: File

REGISTERED PROFESSIONAL ENGINEER
51411PE
OREGON
SEPT. 22, 1998
TIMOTHY T. TERICH

Expires: 12-31-00

C:\TM\CT2\111599.DOC

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone: (503) 231-6078 Fax: (503) 231-6462

Leonard Lodder

From: Leonard Lodder [llodder@arbucklecostic.com]
Sent: November 23, 1999 9:31 AM
To: John Whittington (E-mail)
Subject: CH2

John
I have not as yet received your letter regarding structural issue on the Transit Mall Deck. I would like to get this issue put to rest with Tim Terich.

Leonard Lodder, A.I.A.
Arbuckle Costic Architects, Inc.
363 State Street,
Salem, OR 97301-3533
email: llodder@arbucklecostic.com

7828-3E

CENTURY WEST
ENGINEERING CORPORATION
LEADING THROUGH EFFECTIVE SOLUTIONS

STRUCTURAL OBSERVATION REPORT

Date: December 2, 1999
Project name: Courthouse Square
Weather: partly cloudy, 45 F
Project #: 40903.001.04-7000

To: Leonard Lodder – Arbuckle Costic Architects
From: Tim Terich, P.E. – Century West Engineering

Met on site with Steve Schaad – Pence Kelly Construction to observe post-tensioned tendon and rebar placement at the west pour of the roof. ET Williams of Carlson Testing and Bob Keller of the City of Salem were present. Tendons and rebar appeared to be installed per plan and specification. We field adjusted the banded tendon profile on grid D down two inches between 11 & 12 to account for the added crown in the forms. Diagonal bars needed to be added at the corners of the elevator openings. Hairpins were not yet installed at elevator #3.

The metal stairs had been placed in the east stairwell.

Time arrived: 11:45am
Time Left Job: 1:30pm

Structural Observation by:
Century West Engineering Corp.
Timothy T. Terich, P.E.

cc: File

REGISTERED PROFESSIONAL ENGINEER
51411PE
OREGON
SEPT. 22, 1989
TIMOTHY T. TERICH
Expires: 6.30.00

C:\TIM\CT\2\120299.DOC

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone: (503) 231-6078 Fax: (503) 231-6482

01/18/01 @ 9:32 AM

Leonard Lodder

From: Leonard Lodder [llodder@arbucklecostic.com]
Sent: December 15, 2000 4:27 PM
To: 'Jeff Hamm'; 'CLewis@melvinmark.com'
Cc: 'Alan Puderbaugh'; 'Dylan Hill'; 'John Whittington'
Subject: RE: Transit Mall

I have already looked at the cracks. The movement is entirely thermal, and appears to be worst in the grouted pavers. The solution is probably to add a another caulked expansion joint at this point. This will allow the thermal movement to be spread out over three joints. In the sand bedded pavers, I hadn't noticed as much movement, although it was evident that the joints were looser than when originally laid. The slab at the base of the aprons is doweled to the structure.

The differential settlement in the north east center section is possible given the difficulty they had drying this side out. I would continue to watch this one closely and treat it as a warranty issue. In any event, repairs will probably have to wait until summer. The differential settlement in this area does appear nominal.

Leonard Lodder, A.I.A.
Arbuckle Costic Architects, Inc.
363 State Street,
Salem, OR 97301-3533
email: llodder@arbucklecostic.com <mailto:llodder@arbucklecostic.com>

-----Original Message-----
From: Jeff Hamm [mailto:hammj@cherriots.org]
Sent: December 15, 2000 4:12 PM
To: llodder@arbucklecostic.com; CLewis@melvinmark.com
Cc: Alan Puderbaugh; Dylan Hill; John Whittington
Subject: Transit Mall

Peter van Niekerk indicated that the most vulnerable place on the transit
mall would be the transition area between pavers on the mall slab to pavers
laid on the ground and through the sidewalk/approach aprons. Looks like he
may be right. Staff has pointed out to me some cracks that are opening up
between pavers and between the grouted pavers on the sidewalks essentially
underneath the bridge structures.

I have also noticed some differential settling of some pavers in the north
half of the transit mall sort of in the east center region of the expanse.
Any cause for concern?

3828-3E

ARBUCKLE COSTIC ARCHITECTS, INC.
363 State Street
Salem, Oregon 97301-3533
(503) 581-4114, Fax (503) 581-3655,
E-mail: architects@arbucklecostic.com

FIELD OBSERVATION REPORT

PROJECT:	Courthouse Square 555 Court Street NE Salem, Oregon 97301	JOB NO.	9828
DATE:	December 23, 1999	REPORT NO.	12
PRESENT AT SITE:	Leonard Lodder, Arbuckle Costic Architects Jim Cook, Interface Engineering	Steve Schaad, P/K Kevin Stickley, Oregon Cascade Doug Hoppin, Brainard Sheet Metal	

1. Noted that the P.T. had been stressed on the east end of the roof plate. Reviewed and photographed a crack in the end of the slab at the pour strip between Grid Lines H & J, south of Grid Line 11. Steve has agreed to epoxy inject the crack before the concrete pour for the pour strip on Monday, December 27, 1999.

cc: Billy Wasson, Marion County
John Whittington, Salem Area Mass Transit District
Craig Lewis, Melvin Mark Development Corp.
Century West Engineering
Interface Engineering
Westech Engineering
Pence/Kelly Construction

File: 9828-9A

By: Leonard Lodder, AIA

This confirms and records our interpretation of the discussions which occurred and our understanding reached during this meeting. Please notify in writing within seven days of the date indicated above if the interpretation or description is incomplete or inaccurate.

CENTURY WEST
ENGINEERING CORPORATION
LEADING THROUGH EFFECTIVE SOLUTIONS

STRUCTURAL OBSERVATION REPORT

Date: January 25, 2000
Project name: Courthouse Square
Weather: Clear, 48 F
Project #: 40903.001.04-7000

To: Leonard Lodder – Arbuckle Costic Architects
From: Tim Terich, P.E. – Century West Engineering

Met on site with Steve Schaad – Pence Kelly Construction to observe construction progress at busmall slab.

Reviewed tendon and rebar placement for pour D. Added top steel for columns along grid 6.5 had not yet been placed. Additional stirrups will be placed at the lintel for the rollup doors along grid 3.2.

The precast concrete slab units were being installed. The weld at the underside of the slab was reduced from ½" to ¼" double groove weld. A sketch was provided for the Carlson Testing inspector.

Time arrived: 12:15pm
Time Left Job: 1:30pm

Structural Observation by:
Century West Engineering Corp.
Timothy T. Terich, P.E.

cc: File

C:\TIM\CT20012500.DOC

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone: (503) 231-6078 Fax: (503) 231-6482

CENTURY WEST
ENGINEERING CORPORATION
LEADING THROUGH EFFECTIVE SOLUTIONS

STRUCTURAL OBSERVATION REPORT

Date: February 8, 2000
Project name: Courthouse Square
Weather: Showers, 42 F
Project #: 40903.001.04-7000

To: Leonard Lodder – Arbuckle Costic Architects
From: Tim Terich, P.E. – Century West Engineering

Met on site with Steve Schaad and Gary White to observe construction progress at busmall slab.

Reviewed Pour E. The grouted tendons and rebar appeared to be installed per plan.

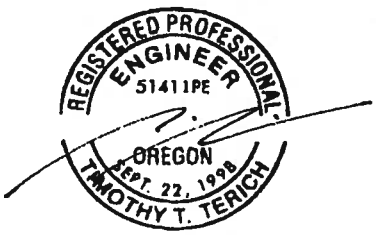
Approved the modification of the "eyebrow" canopy connections at the south face of the building.

Observed reported cracks and spalling in the top of some of the columns along grids 9 and 10 at busmall. It appears that shrinkage in the slab may be 'pulling' some of the corner bars at the tops of the columns. Some of these cracks are substantial enough to require repair. The reduction in column bearing area and anticipted movement in the slab will cause eventual spalling of these cracks if they are not repaired. Repairs may include epoxy injection, carbon fiber wrapping and grout patching. We agreed to wait until the entire busmall is poured to determine a course of action and see if similar cracks occur on other columns.

Time arrived: 12:00m
Time Left Job: 2:00pm

Structural Observation by:
Century West Engineering Corp.
Timothy T. Terich, P.E.

cc: File



Expires: 6-30-02

C:\TIM\CT2\020800.DOC

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone: (503) 231-6078 Fax: (503) 231-6482

3828.96
ACA022461

02/10/00

Leonard Lodder

From: Craig Lewis [CLewis@melvinmark.com]
Sent: February 09, 2000 1:09 PM
To: llodder@arbucklecostic.com
Subject: Re: RE: Columns @ busmall

Leonard-
Thanks for following up.
CL

>>> "Leonard Lodder" <llodder@arbucklecostic.com> 02/09 12:58 PM >>>
Craig
Tim Terich will be present at our meeting tomorrow morning. I have asked him to evaluate a preventative fix, if there is such a thing, rather than wait till all of the shrinkage works its way out of the slab. Tim is contacting some other sources as well.

Leonard Lodder, A.I.A.
Arbuckle Costic Architects, Inc.
363 State Street,
Salem, OR 97301-3533
email: llodder@arbucklecostic.com <mailto:llodder@arbucklecostic.com>

-----Original Message-----
From: Craig Lewis [mailto:CLewis@melvinmark.com]
Sent: February 09, 2000 11:01 AM
To: whittingtonj@cherriots.org; bwasson@opengovt.open.org
Cc: llodder@arbucklecostic.com
Subject: Columns @ busmall

John-
I spoke to Dave H. this morning. Apparently we have have four or five columns that are cracking at the columns heads. These columns do not appear to be concentrated in any particular area, and, according to P/K, do not appear beneath the building. Tim Terich has been on site to inspect the problem and is working on a solution which may ential epoxy injection and/or wrapping the column for additional reinforcement.

I have contacted Leonard, who is aware of the issue, and have asked him to inspect the columns and contact Tim to see if he can attend tomorrow's meeting. I discussed the issue with Billy this a.m. and he is aware of the issue.

Byron and I will be at the site at 8:00 tomorrow to look at the columns prior to the construction meeting. Any questions, please give me a call.

Thanks
CL

3828.3E

CENTURY WEST
ENGINEERING CORPORATION
LEADING THROUGH EFFECTIVE SOLUTIONS

Date: February 10, 2000
To: Leonard Lodder, Arbuckle Costic
From: Tim Terich
Project #: 40903.001.04 - 7000
Subject: Courthouse Square – busmall columns

We have inspected the cracking at the top of some of the columns supporting the busmall deck. These cracks are cosmetic in nature. The cracks are fracturing the area of concrete that is outside the core of the columns, known as 'cover' concrete for the reinforcing. This 'cover' concrete adds no strength to the column. It is required by code for corrosion and fire resistance. The concrete in the column 'core' provides all the structural strength for the column.

We suspect that a combination of slab shrinkage stresses and the localized concentration of downward compressive forces from the post-tensioning tendons are causing the intermittent cracks in some columns.

Repair of some of the larger cracks will be necessary. Where large cracks exist, we recommend removing loose concrete pieces, patching, and wrapping the top two feet of the column with a reinforcing epoxy-fiber system. Where cracks are not loose, epoxy-injection of the cracks and wrapping will suffice. In many columns, only epoxy-injection will be necessary. We recommend treating these cracks since the vibration and movement of the busmall slab may eventually loosen or enlarge the cracks.

We are taking measures to try to prevent further cracking in the remainder of the deck pours. We have directed the contractor to ensure that less that ½ inch of column concrete protrudes above the forms. Pence/Kelly will also chip away the sharp corners of the columns that protrude above the forms. These corners provide opportunity for stress concentrations in the column tops.

We will evaluate all columns for cracking after the entire busmall slab has been poured, stressed and forms are removed. Most cracking in the columns (if any) should occur after form removal when the concrete achieves full 28-day strength. We will evaluate the columns and provide a detailed repair scheme for the affected columns at that time.

Please call me with any questions or comments.

Regards,

Timothy T. Terich, P.E.
Project Manager

C:\TM\CT2\COLUMN8.DOC

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone: (503) 231-6078 Fax: (503) 231-6482

9828.96

MELVIN MARK COMPANIES

MELVIN MARK PROPERTIES • MELVIN MARK BROKERAGE CO. • MELVIN MARK CONSTRUCTION CO. • MELVIN MARK DEVELOPMENT CO.

February 18, 2000

Leonard Lodder
Project Architect
Arbuckle Costic Architects
363 State Street
Salem, Oregon 97301

Dear Leonard:

This correspondence is in regards to the cracking observed at the top of several columns that support the Courthouse Square transit mall. As you are aware, per Century West's memo dated February 10, Tim Terich has concluded that these cracks are the result of slab shrinkage and the downward pressure caused by the stressing of the post tensioned deck. Century West has suggested that the owner's repair these cracks either through epoxy injection or a carbon/epoxy wrap. Additionally, Tim has generally described how Pence/Kelly could potentially reduce this cracking on future pours. The owners appreciate Tim's timely response to the problem.

Marion County and SAMT continue to remain concerned about the number and size of the observed cracks. This concern is obviously heightened by fact that these cracks appear in critical column locations beneath the busmall. With the anticipated bus loading and deflection we want to make absolutely certain the structural integrity of the busmall has not been, and will not be, compromised.

At yesterday's construction meeting you indicated that you will follow up with Tim to get a detailed written description of his recommended modifications to the top of the columns in those areas that have not yet been poured. Please forward a copy to P/K as soon as possible to prevent any delays or additional costs. MMDC has advised, and the owners agree, that it would be prudent to employ the services of another engineering firm to verify the most likely cause of the cracking at the top of the columns. It would be to benefit of all those involved in project to confirm, with as much certainty as possible, that the cracks are purely a cosmetic issue and not a structural issue. We would ask Arbuckle to contract and pay for these services directly. If Arbuckle chooses not to obtain a second professional opinion, the owners do reserve the right to hire the engineer directly and seek remuneration.

Thank you for your attention and consideration in this matter. Please feel free to contact me with any questions or comments.

Sincerely,

Craig R. Lewis
Project Manager

CC: Billy Wasson-Marion County
John Whittington-Salem Area Transit

CENTURY WEST
ENGINEERING CORPORATION
LEADING THROUGH EFFECTIVE SOLUTIONS

STRUCTURAL OBSERVATION REPORT

Date: February 24, 2000
Project name: Courthouse Square
Weather: Sunny 50F
Project #: 40903.001.04-7000

To: Leonard Lodder – Arbuckle Costic Architects
From: Tim Terich, P.E. – Century West Engineering

Met on site with Steve Schaad and Gary White to observe construction progress at busmall slab.

Reviewed Pour F. Unbonded tendons and rebar appeared to be installed per plan so far. Added top reinforcing at the column line 6.5 was not yet installed. Pour is scheduled for Monday.

Reviewed and approved the modifications to the typical double-angle, hanging canopy connections with the welder foreman.

Observed the floor grinding of slabs in the west stairs, floor 3 & 5, north side, where the concrete was poured too high. Griding has exposed 2-3 tendons running parallel to the door opening. The tendons lie within 18" of the concrete wall. The tendons are exposed because they were within 1-2" of the top of the slab. These tendons are not significant to the integrity of the slab. They can be torch-cut and removed. Ensure that safety precauctions are taken during this process. Do not let anyone near the dead or stressing ends during cutting. After cutting, the tendons can be removed. Please call me directly if more than 3 tendons must be cut within 18" of the stairway walls in these areas.

Observed cracks in the top of column 3a & D. No other cracks were apparent at identical columns along this line. The cracking is likely due to the localized compressive stresses induced by the termination of the banded run at this column. Unlike the similar columns along gird 10, this line of columns does not have shearhead steel running east-west. This steel provides rigidity to the slab in this highly compressed area. I directed Gary White to install additional bars in the beam and slab in the east-west direction. This will provide additional localized strength to the slab at these areas. Attached is a sketch for the added bars at these areas.

Time arrived: 11:30am
Time Left Job: 1:45pm

REGISTERED PROFESSIONAL ENGINEER 51411PE OREGON SEPT. 22, 1998 TIMOTHY T. TERICH
Expires: 6.30.02

Structural Observation by:
Century West Engineering Corp.
Timothy T. Terich, P.E.

cc: File

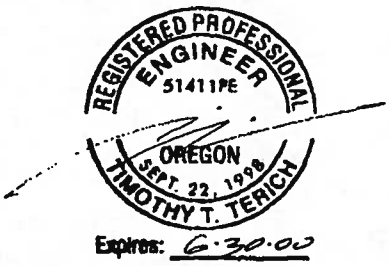
C:\TIM\CT2\022400.DOC

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone: (503) 231-6078 Fax: (503) 231-6482

CENTURY WEST
ENGINEERING CORPORATION
LEADING THROUGH EFFECTIVE SOLUTIONS

STRUCTURAL OBSERVATION REPORT

Date: March 7, 2000
Project name: Courthouse Square
Weather: cloudy 42F
Project #: 40803.001.04-7000



Expires: 6-30-00

To: Leonard Lodder – Arbuckle Costic Architects
From: Tim Terich, P.E. – Century West Engineering

Met on site with Steve Schaad, Gary White, Dave Hays and Mike Hayford to inspect cracked columns busmall slab. (Leonard Lodder was present for part of the meeting).

Busmall column cracks:
The following is a summary of the discussion:

Mr. Hayford's feels that the cracking at the top of the columns is due to use of the 3/8-inch aggregate in the concrete at the columns. (The 3/8-inch aggregate mix was substituted for ¾-inch on some of the columns to alleviate difficulty placing and vibrating concrete in the forms due to crowding of the reinforcing.) He said that the smaller aggregate is much weaker in the unreinforced areas of the columns, in this case, the cover concrete at the edges of the columns. He said the load that was imposed on these areas was enough to induce cracking. Additionally, the tops of column pours generally has more cement paste than aggregate, vibration of the column brings paste and water to the top of the column, and settles the aggregate to the bottom a bit. At the very top of the column pour it is common for the aggregate content to be reduced. We chipped-away portions of these area and discovered that indeed aggregate was sparse at the very top inch or so. He observed that the concrete within the rebar ties was intact and undamaged. He stated that any concrete outside the rebar is non-structural, and does not contribute to column strength. Mr. Hayford said that these cracks are cosmetic in nature, and need only be patched and or epoxy-injected. I asked if he felt that carbon-fiber wrapping was necessary, he said no, epoxy is enough.

Mr. Hayford said he would submit a letter regarding his observations – I will forward copies to Arbuckle Costic, Melvin Mark and Pence Kelly upon receipt.

Other progress: Observed progress placement of grouted pt tendons and reinforcing for Pour G. All rebar and pt placement was per plan and specification. Columns along grid 3a were being formed and poured – installation and reinforcing looked correct. Four of the busmall canopy frames along grid 6a (west side) were bolted in place. Discussed welding requirements for the canopies with Steve Schaad and welding foreman. The clocktower concrete was completely poured-out. The steel framework was installed.

Time arrived: 11:30am
Time Left Job: 2:15pm

Structural Observation by:
Century West Engineering Corp.
Timothy T. Terich, P.E.

cc: Mike Hayford

C:\TIMCT\2030700.DOC

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone: (503) 231-8078 Fax: (503) 231-8482

3828.3B

03/14/2000 11:37 5036249770 FCE TIGARD PAGE 01

CENTURY WEST
ENGINEERING CORPORATION
LEADING THROUGH EFFECTIVE SOLUTIONS

FAX TRANSMITTAL

Date:	March 14, 2000	
# of Pages:	3 (Including Cover Page)	
	Original will follow No	
To:	Leonard Lodder, Arbuckle Costic	Fax #: 503-581-3655
	Steve Schaad, P/K	Fax #: 503-364-5382
From:	Tim Terich	
Project #:	40903.001.04 - 7000	
Subject:	Courthouse Square	

Comments:

Attached is a column crack "map" for documentation and monitoring. Please comment, add, subtract etc to this draft so I can finalize.

Thanks,

T3

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone (503) 231-6078 Fax: (503) 231-6482

C:\TIM\CT2\CT2FAX.DOC

CENTURY WEST
ENGINEERING CORPORATION
LEADING THROUGH EFFECTIVE SOLUTIONS

STRUCTURAL OBSERVATION REPORT

Date: March 14, 2000
Project name: Courthouse Square
Weather. N/A
Project #. 40903.001.04-7000

DRAFT

To: Leonard Lodder – Arbuckle Costic Architects
From: Tim Terich, P.E. – Century West Engineering

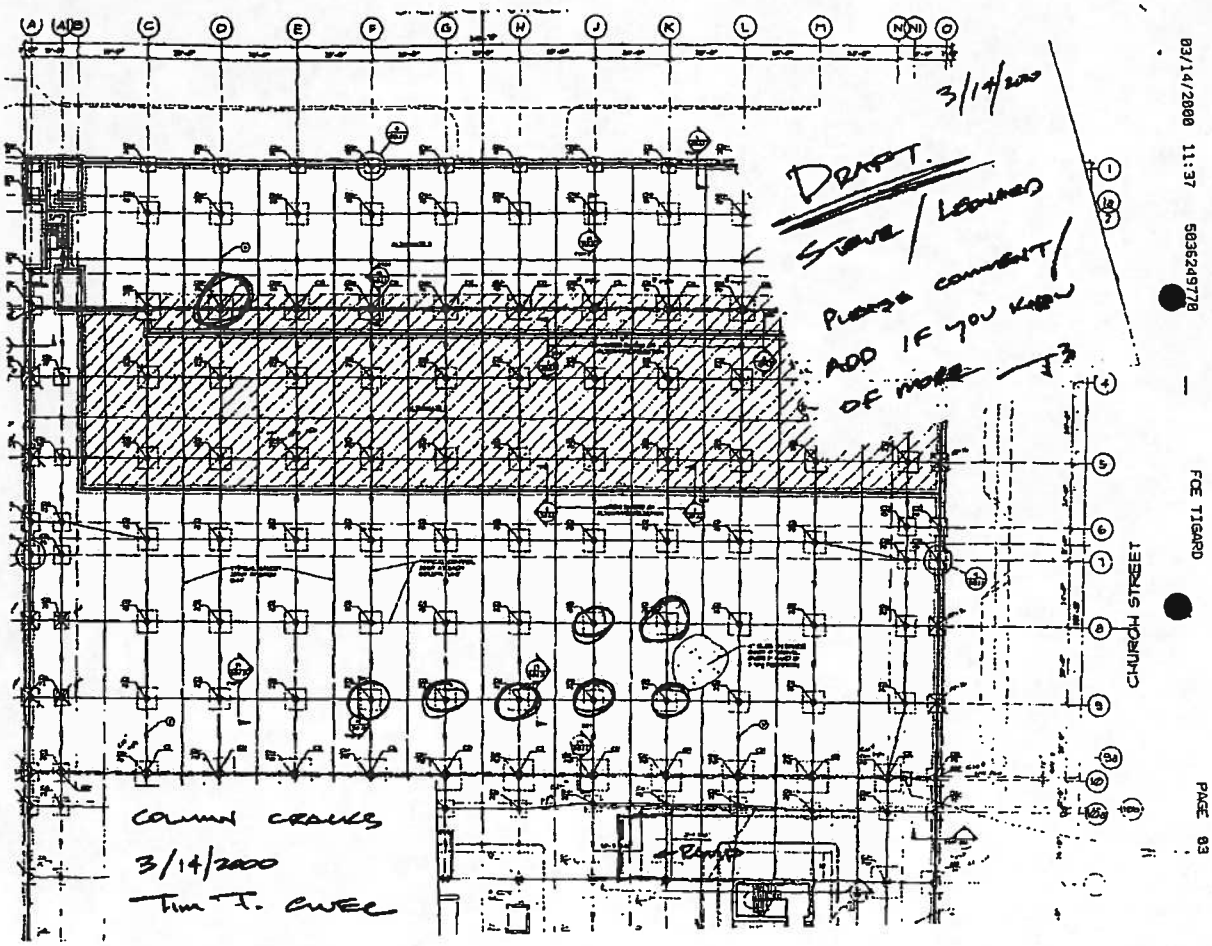
Attached is a map of the columns in the busmall slab that have sustained cracking at the top of the columns. I have circled columns that show cracking based on my observations over the past two months.

Location	Description	Anticipated action
Column 9-F	minor cracking (less that 1/16")	epoxy inject
Column 9-G	minor cracking (less that 1/16")	epoxy inject
Column 9-H	minor cracking (less that 1/16")	epoxy inject
Column 9-J	1/8" cracking at top corners, spalled concrete removed by hand 3/7/2000. We recommend removing loose material, patching and epoxy injecting.	
Column 9-K	1/8" cracking at top corners.	epoxy inject
Column 8-J	minor cracking (less that 1/16")	epoxy inject
Column 8-K	minor cracking (less that 1/16")	epoxy inject
Column 3a-D	1/8" cracking at top corners, some spalled concrete removed by hand 3/7/2000. We recommend removing loose material, patching and epoxy injecting.	

Structural Observation by:
Century West Engineering Corp.
Timothy T. Terich, P.E.

C:\TIM\CTZ\COLUMNMAP.DOC

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone. (503) 231-6078 Fax. (503) 231-6482


3/14/2000
DRAFT.
STAMP / LEGIBLE
PLEASE COMMENT/
ADD IF YOU KNOW
OF MORE
COLUMN CRACKS
3/14/2000
Tim T. CWEC
CHURCH STREET
03/14/2000 11:37 5035249778 FGE TIGARD PAGE 03

ACA013023

05/03/00

Leonard Lodder

From: Craig Lewis [CLewis@melvinmark.com]
Sent: May 02, 2000 4:28 PM
To: llodder@arbucklecostic.com
Subject: Cracking @ Northwest and Northeast Corners of P1

Leonard-
I understand Tim was going to inspect the cracks at the NW and NE corners of the garage on Friday. Did you get a read from him on cause and repair recommendations. Similar to the cracking at the columns heads I would like Tim to identify those areas that should be monitored. I am planning on having Carlson tag and monitor these cracks as well. I am fairly concerned about these new cracks, particularly as it pertains to future leaking potential. Thanks.
CL

7828-3E

CENTURY WEST
ENGINEERING CORPORATION
LEADING THROUGH EFFECTIVE SOLUTIONS

STRUCTURAL OBSERVATION REPORT

Date: May 16, 2000
Project name: Courthouse Square
Weather: Partly Cloudy 65F
Project #: 40903.001.04-7000

To: Leonard Lodder – Arbuckle Costic Architects
From: Tim Terich, P.E. – Century West Engineering

Met on site with Steve Schaad to observe construction progress at busmall slab.

Observed the welding of canopy frames along gird 3. The installation of spacer plates behind the canopy frames was necessary due to out-of-plumb condition of concrete beam. The plates and spacers were installed as directed.

Reviewed the air duct framing condition around grids N-3. At the north side of the duct, 4" x 14 gauge studs may be substituted for 6" studs.

Reviewed cracks in walls and overhead door in the area around grids N-3. The shrinkage in the slab was restrained, or 'hung-up' on a few corners of the concrete walls below. None of the cracks present a structural problem. These cracks can be repaired cosmetically by sacking and patching the areas.

Observed significant cracking along the retaining wall at grids O-10. The in-wall pilaster bonded to the slab and was pulled approximately ½" away from the wall. A vertical crack exists from the top of the wall, down to about ½ the height. Due to the significant separation, we recommend epoxy-injecting this crack. To insure that water cannot enter through the crack, we recommend excavating the backside of the wall and installing a Bentonite strip in the crack. This crack does not present a structural problem as long as the wall is waterproofed and epoxy-injected. We do not anticipate any further shrinkage movement.

5/16/2000

Time arrived: 1:30pm
Time Left Job: 2:00pm

REGISTERED PROFESSIONAL ENGINEER 51411PE OREGON SEPT. 22, 1998 TIMOTHY T. TERICH
Expires: 6-30-2000

Structural Observation by:
Century West Engineering Corp.
Timothy T. Terich, P.E.

cc: File

C:\TIM\CT2\051600.DOC

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone: (503) 231-6078 Fax: (503) 231-6482

CENTURY WEST
ENGINEERING CORPORATION
LEADING THROUGH EFFECTIVE SOLUTIONS

STRUCTURAL OBSERVATION REPORT

Date: May 16, 2000
Project name: Courthouse Square
Weather: Partly Cloudy 65F
Project #: 40903.001.04-7000

To: Leonard Lodder – Arbuckle Costic Architects
From: Tim Terich, P.E. – Century West Engineering

Met on site with Steve Schaad to observe construction progress at busmall slab.

Observed the welding of canopy frames along gird 3. The installation of spacer plates behind the canopy frames was necessary due to out-of-plumb condition of concrete beam. The plates and spacers were installed as directed.

Reviewed the air duct framing condition around grids N-3. At the north side of the duct, 4" x 14 gauge studs may be substituted for 6" studs.

Reviewed cracks in walls and overhead door in the area around grids N-3. The shrinkage in the slab was restrained, or 'hung-up' on a few corners of the concrete walls below. None of the cracks present a structural problem. These cracks can be repaired cosmetically by sacking and patching the areas.

Observed significant cracking along the retaining wall at grids O-10. The in-wall pilaster bonded to the slab and was pulled approximately ½" away from the wall. A vertical crack exists from the top of the wall, down to about ½ the height. Due to the significant separation, we recommend epoxy-injecting this crack. To insure that water cannot enter through the crack, we recommend excavating the backside of the wall and installing a Bentonite strip in the crack. This crack does not present a structural problem as long as the wall is waterproofed and epoxy-injected. We do not anticipate any further shrinkage movement.

5/16/2000

Time arrived: 1:30pm
Time Left Job: 2:00pm

REGISTERED PROFESSIONAL ENGINEER 51411PE OREGON SEPT. 22, 1998 TIMOTHY T. TERICH

Expires: 6-30-2000

Structural Observation by:
Century West Engineering Corp.
Timothy T. Terich, P.E.

cc: File

C:\TIM\CT2\051600.DOC

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone: (503) 231-6078 Fax: (503) 231-6482

9828-9B

ARBUCKLE COSTIC ARCHITECTS, INC.
363 State Street
Salem, Oregon 97301-3533
(503) 581-4114, Fax (503) 581-3655,
E-mail llodder@arbucklecostic.com

FAX TRANSMITTAL

TO:	Tim Terich, P.E. Century West Engineering Corporation 825 NE Multnomah, Suite 425 Portland, Oregon 97232	DATE:	July 21, 2000
		JOB NUMBER:	9828
		RE:	Courthouse Square
FAX NO.	503.231.6482 503.624.9770	NO. OF PAGES (including this page)	2

ORIGINAL BY MAIL:	Yes	No
		X

COMMENTS:

Could you confirm that the work referenced in RFI 549 is required.

During the Construction meeting yesterday, it was suggested that we need to establish a column capital repair schedule for the columns under the Transit Mall. It was felt that you should be the one to identify the columns and prescribe the various fixes required so that we can issue a Proposal Request for this work.

If you need Cad file of this the parking area, just let me know.

cc: Greg Lewis, MMDC

By: Leonard Lodder, A.I.A.

Please call us if you have any questions on the document(s) or if there are any pages missing

File No.: 9828-3D

CENTURY WEST
ENGINEERING CORPORATION
LEADING THROUGH EFFECTIVE SOLUTIONS

FAX TRANSMITTAL

Date: July 26, 2000
# of Pages: 2 (Including Cover Page)
Original will follow No

To: Leonard Lodder, Arbuckle Costic — Fax # 503-581-3655
Steve Schaad, P/K — Fax #: 503-364-5382
From: Tim Terich TT3
Project #: 40903.001.04 - 7000
Subject: Courthouse Square – RFI #549

Comments:

Leonard & Steve,

I am re-sending you the attached field report indicating which columns to epoxy-inject. Steve, please use the same approved epoxy we have used on the cracks that were patched on the concrete beams at the Hatfield Plaza area. Please call me with any questions or comments.

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone: (503) 231-6078 Fax: (503) 231-6482

Carlson Testing, Inc.

Main Office
P.O. Box 23814
Tigard, Oregon 97281
Phone (503) 684-3460
FAX (503) 684-0954

Branch Office
4060 Hudson Ave., NE
Salem, OR 97301
Phone (503) 589-1252
FAX (503) 589-1309

June 29, 2000
99-S1132.CTI
PERMIT NO. 401418

FIELD INSPECTION REPORT

DATES COVERED: April 20, 1999 to June 21, 2000

PROJECT: Salem Courthouse Square
ADDRESS: 555 Court Street NE -- Salem, Oregon
INSPECTOR: R.C. Collins, ICBO #1026491-48

04-20-1999: A CTI representative was present on site to perform an initial inspection of cracks and place monitors at the following locations:

9B – hairline crack initially
9C – 1/16" crack initially
9D – 1/16" crack initially
9E: - 1/16" crack initially
8D: - 1/16" crack initially
8C: - 1/16" crack initially

05-04-2000 to 06-21-2000: This inspector visited the site periodically to check the crack monitors on the following dates and found no change / increase in crack size:

5/4/00
5/19/00
6/21/00

Work observed this date conforms to project plans, details and specifications.

Our report pertains to the material tested/inspected only. Information contained herein is not to be reproduced, except in full, without prior authorization from this office.

If there are any further questions regarding this matter, please do not hesitate to contact this office.

Respectfully submitted,

CARLSON TESTING, INC.

Brian Leach
Project Manager

cc: Salem Area Mass Transit District
Melvin Marks Development - Craig Lewis
Arbuckle Costic Architects Inc - Leonard Lodder
Pence Kelly Construction Inc - Steve Schaad
City of Salem Bldg. & Safety Div. – Bob Garrison
Marion County Facilities Management - Bob McCune
Century West Engineering - Timothy T Terich

PENCE/KELLY
CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 389-7223
Portland (503) 224-9881 Fax (503) 585-7477
CCB # 63435

Request for Information

TO: Leonard Lodder
Arbuckle Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

RFI No. 00549
DATE: 7/18/00
JOB: 99006
ISSUE No.:

Project: Courthouse Square
Subject: Epoxy for cracks for PR #114
Please process and return by no later than 7/25/00

Question

Spec. Ref.

Dwg. Ref. #

Tim Terrich has said that the cracks that wil be fixed in PR #114 must be epoxy injected. PR #114 does not cover this. This will take about 12 man hours and aprox $ 320 in material. (About $ 1000)

Signed: John Grammels

Response

By: Firm:

Date:

Upon receipt of this RFI you must notify Pence/Kelly within 2 days, whether the RFI is a no cost change, or an extra to your contract. Additional costs must be submitted within 10, days of receipt.

By: Date:

CC:

CENTURY WEST
ENGINEERING CORPORATION
LEADING THROUGH EFFECTIVE SOLUTIONS

STRUCTURAL OBSERVATION REPORT

Date: March 14, 2000
Project name: Courthouse Square
Weather: N/A
Project #: 40903.001.04-7000

To: Leonard Lodder – Arbuckle Costic Architects
From: Tim Terich, P.E. – Century West Engineering

Attached is a map of the columns in the busmall slab that have sustained cracking at the top of the columns. I have circled columns that show cracking based on my observations over the past two months

Location	Description	Anticipated action
Column 9-F	minor cracking (less that 1/16")	epoxy inject
Column 9-G	minor cracking (less that 1/16")	epoxy inject
Column 9-H	minor cracking (less that 1/16")	epoxy inject
Column 9-J	1/8" cracking at top corners, spalled concrete removed by hand 3/7/2000. We recommend removing loose material, patching and epoxy injecting.	
Column 9-K	1/8" cracking at top corners.	epoxy inject
Column 8-J	minor cracking (less that 1/16")	epoxy inject
Column 8-K	minor cracking (less that 1/16")	epoxy inject
Column 3a-D	1/8" cracking at top corners, some spalled concrete removed by hand 3/7/2000. We recommend removing loose material, patching and epoxy injecting	

Structural Observation by:
Century West Engineering Corp
Timothy T. Terich, P.E.

C:\TIM\CT2\COLUMNMAP.DOC

825 NE Multnomah, Suite 425 Portland, OR 97232
Phone. (503) 231-6076 Fax. (503) 231-6482

Leonard Lodder

From: Leonard Lodder [llodder@arbucklecostic.com]
Sent: Thursday, November 07, 2002 4:07 PM
To: Thomas Kuhns
Subject: RE: Salem Courthouse Square

Tom
Both the County and the Transit District would have received copies of the prints supplied by the Contractor. Steve Schaad the Construction Supt. was pretty good about recording the additional bar and cable. Much of the additional bar was introduced by Tim Terich during his inspections. The north Pad was grouted PT and from recollection, there was added PT, but I don't think it was a lot.

On the CAD side of things, I'm not sure why you are having problems. The drawings were produced in R-14, and we consciously worked entirely in model space, although some of our consultants worked in paper space for plotting. (Paper space is finally making sense to me, now that we can set up multiple layout tabs). I do know that with R14, I have always insisted that staff soft path x-refs, and since I spent a lot of time in the drawings, they couldn't get away with telling me that they had soft pathed while in fact they were hard pathing. R2000/2002 reacts a little differently however because of long file names.

I will attach our current plot style file, suitable for use in R2000/2002 with the line weights properly assigned. It has been named for the HP 755CM but I use it for a variety of plotters now.

Hope this works

Leonard Lodder, AIA
P: 503.581.4114
F: 503.581.3655

-----Original Message-----
From: Thomas Kuhns [mailto:tkuhns@MAHLUM.com]
Sent: Thursday, November 07, 2002 3:44 PM
To: 'Leonard Lodder'
Subject: RE: Salem Courthouse Square

Leonard,

Where would the record for the added rebar and PT be? I did recieve a few miscellaneous drawings for a sump pit, drawings 1-9, but that is all. I will contact the original structural engineer, Froelich Engineering, for a consultation fee for our project. Do you think they should have adequate records for what was added? Was anything added in the area of our building to your recollection?

We were finally able to print your drawings from the CD with some difficulty. It seems that when we tried to reprint the drawing from Autocad 2000, it would only print the information layer and not the xrefs eventhough, when we opened the drawing, all of the xrefs came up. We ended up printing the sheets in Autocad 14 but with very heavy pen settings. Any idea what we are doing wrong?
We would appreciate any help.

Thanks, Tom Kuhns

-----Original Message-----
From: Leonard Lodder [mailto:llodder@arbucklecostic.com]

9828.3E

Sent: Thursday, November 07, 2002 3:15 PM
To: Thomas J. Kuhns
Subject: Salem Courthouse Square

I have burned a new CD with the Record drawings plus the original Construction Drawings for Structural and Landscaping. As we discussed on the phone, we never had provided structural record drawings to the client, largely because the team had something of a falling-out over fees on supposed additional services. The Client and Project management team supported us in our dispute and agreed to the waiver on providing the record drawings. I can tell you that there were substantial amounts of PT and re-bar added to the project during construction.

I will send out the CD today

Leonard Lodder, AIA
P: 503.581.4114
F: 503.581.3655

APPENDIX E
STRUCTURAL ANALYSIS RESULTS - PERBIX BYKONEN DRAFT MEMO
DATED MAY 2, 2011

perbix bykonen

820 John Street, #201, Seattle, WA 98109
phone 206-264-7784 fax 206-264-7769

memorandum

Date: 5/2/11
To: Golder Associates Inc.
18300 NE Union Hill Road
Suite 200
Redmond, WA 98052

From: Todd Perbix
Project: Courthouse Square
Project #:
Copy to:

Attn: Mark Liebman

Re: Courthouse Square Structural Analysis

Summary

The purpose of our work was to examine the structural portions of the design and construction phases of the Courthouse Square project. Our work focused strictly on the structural elements as they were designed and built. Non-structural elements, such as the building's interior and exterior finishes' and the HVAC, electrical and transportation systems were not the subject of this review. We were charged with;

- Determining the integrity of the work
- Noting what, if anything, went wrong during these phases
- Noting any misconduct or negligence or breach of the standard of care discovered as a part of our review
- Providing recommendations aimed at avoiding difficulties on future projects.

To accomplish this scope of work, we completed; a limited analysis of the slabs, columns and walls, a thorough review of documentation generated during the design and construction phases, and an investigation of accepted design and construction practices relevant to Courthouse Square.

Our conclusion is, simply stated, that most of the serviceability and almost all of safety concerns noted in the structure stem from various problems in the structural engineers' work. Because of the scope of the deficiencies' noted, and the fact that many of them are safety issues or are issues bearing on the satisfactory long term performance of both the Bus Mall and the Office building, we believe that the engineer of record did not meet the Standard of Care.

We also found numerous quality control, communication, material's deficiencies' and contractor inconsistencies', coupled with evidence of inexperience on the part of both the designers and contractors. Construction problems can be said to have contributed to the poor performance of many element of the building's structure. However, we believe that design deficiencies' are the primary cause of most problems with the structure and that construction problems may have exacerbated them.

Structural Description

Courthouse Square is a full block development located between Chemeketa and Court Streets on the north and south respectively, and between High Street on the west and Church Street on the east.

The structure was constructed between 1999 and 2000. It is composed of two elements; a full site structure at grade over parking below that supports the Bus Mall and the first floor of the office tower, and a five story office block facing Court Street at the south end of the site.

The parking level, located one level below grade, is a conventional concrete slab on grade. All floor and roof levels above the parking level are post-tensioned slabs. All of these slabs are 10” thick, except the first floor of the office which is 8” thick. The slabs of the Bus Mall and the office are separated at the first floor by an expansion joint; making the Bus Mall and office essentially separate above the basement slab.

With the exception of the northern bay of the Bus Mall, all post-tensioning is unbonded and, therefore, not grouted along its length. Strands are generally banded in the north-south (transverse) direction and distributed in the east-west (longitudinal) direction. Banded strands are grouped together to allow the distributed strands to be placed more easily around them. Distributed strands are spaced more or less equidistant throughout the slab. The slabs generally were designed for f’c = 5,000 PSI concrete and all slabs were detailed with #5 @ 24” o/c mild bottom reinforcing. This bottom steel was substantially altered during construction. Very little top steel was provided aside from the top reinforcing of the shear heads over columns and diagonal bars at corners of interior openings. Again, some alterations to mild top reinforcing were made during construction.

Punching shear is resisted by shear heads composed of tied mild steel cages forming a cross over interior columns and a tee at exterior columns. Punching shear is an effect characterized by the slab collapsing by what would look like the column punching through the slab. This serious condition is caused by inadequate slab depth, column perimeter dimension, a lack of appropriate reinforcing, or a combination of two or more of these conditions.

The floors and roof are supported on concrete walls and columns. Concrete strengths specified for these elements are the same as for the floors. Columns tend to be square or rectangular with a minimum dimension of 12”. Vertical reinforcing varies between #8 and #10, Grade 60 bars with #3 ties confining the vertical bars. Lateral ties are spacing at 3” and 6” o/c as in the office structure as indicated on sheet S8.1.1 while the Column Schedule on sheet S1.1.2 indicates #3 @ 12” o/c throughout.

Vertical loads are transferred to the ground using spread and continuous footings with variable bearing capacities depending on the presence of native soil or compacted fill. The geotechnical engineer specified bearing capacities’ of 6000 PSF for native soils and 2500 PSF for compacted fill.

Lateral loads are resisted by concrete shear walls and, in the case of east-west seismic forces in the Bus Mall, by a combination of shear walls and the confinement forces provided by earth backfill. That is, the earth forces on the east and west sides of the bus mall push against each other, thereby cancelling the lateral forces. The Bus Mall, therefore, being entirely subterranean has earth confinement as its

principal method of lateral restraint excepting southward forces which are resisted by the east and west property line walls.

The office portion of the structure is supported laterally by two concrete cores which also form the stair and elevator enclosures. The core elements are relatively small for the purpose and are, as a consequence, heavily reinforced for both shear and overturning. Overturning loads are resisted at the foundations by large concrete spread footings.

Analysis

The analyses discussed below used the specified concrete and steel characteristics. Hence, the concrete used in the analysis of slabs, columns and walls is f'c = 5,000 PSI with a water cement (w/c) ratio of .39 and 3% air entrainment. Reinforcing was assumed to be ASTM A615, Grade 60 and post-tensioning wires are ½" diameter, 7 wire strands conforming to ASTM A416 or A421. Prior to construction, the approved mix design was changed to a 5000 PSI mix with a w/c ratio of .41, 1.5# of Fibermesh and 3% air. This change has no effect on the analysis.

The purpose of assuming the original design specifications was to allow the separation of any defects in design from those of construction. Obviously, both design and construction may contribute to any effect; however, we endeavored to separate them by comparing the expected performance of the design with the measured and observed field conditions. We will be commenting on both the design and construction aspects of the work.

- **Slabs**

Slabs were analyzed using ADAPT software. This program was used in both the original and subsequent analyses and is appropriate since the slab spans, depths and design loads fit easily within the parameters of the software.

Generally, while the slabs are highly compressed, analysis indicates that office slabs designed with longitudinal stresses of 150 PSI would have been adequate. Stresses in the Bus Mall could also be reduced to within the lower range without negatively affecting carrying capacity provided the slab was thicker.

- **Office Building Slabs**

PT slab analysis indicates that all directions of each of the selected slabs are highly compressed. The amount of compressive stress exceeds recommended maximums of 300 psi in most cases. In the transverse (north-south) direction, stresses vary between 335 psi and 487 psi. In the longitudinal (east-west) direction stresses vary between 318 psi and 417 psi

Analysis indicates that the slabs were designed for full live load. This may be reduced for much of the column design because reductions in live load are allowed when the supporting member carries more than 150 square feet of floor area. This allowance is due to the unlikelihood of full live loads being present simultaneously over large areas.

The analysis shows that the compressive stress overbalances the slab dead load by between 180% and 250% in the longitudinal direction while only balancing between 50% and 80% in the transverse direction. The transverse direction, despite its high compressive stresses, balances less dead load because the length of the building in this direction is relatively short and the end spans are long.

These differences in balanced loads account for deflected slab shape as measured in previous investigations. The office slabs are deflecting downward in long spans of the transverse direction while the significant overbalancing in the longitudinal direction causes crowning mid-grid rather than deflection.

Figure 1 below shows a typical deflection pattern for the transverse (north-south) direction. The exaggerated effects of the two end spans can be clearly seen by reviewing the Service Envelope Min pattern. Figure 2 shows the crowning experienced by the slabs in the longitudinal (east-west) direction due to post-tensioning forces.

Deflection Diagrams Figures show short term deflections only (long term deflections are assumed by the program to be twice the amount shown in these diagrams) and are separated into individual effects (dead, live, post-tensioning, etc.). To understand the deflected shape of the slab immediately after stressing, it is necessary to add the post-tensioning, dead and superimposed dead load effects. The combination of these is shown by the Service Envelop Minimum line.

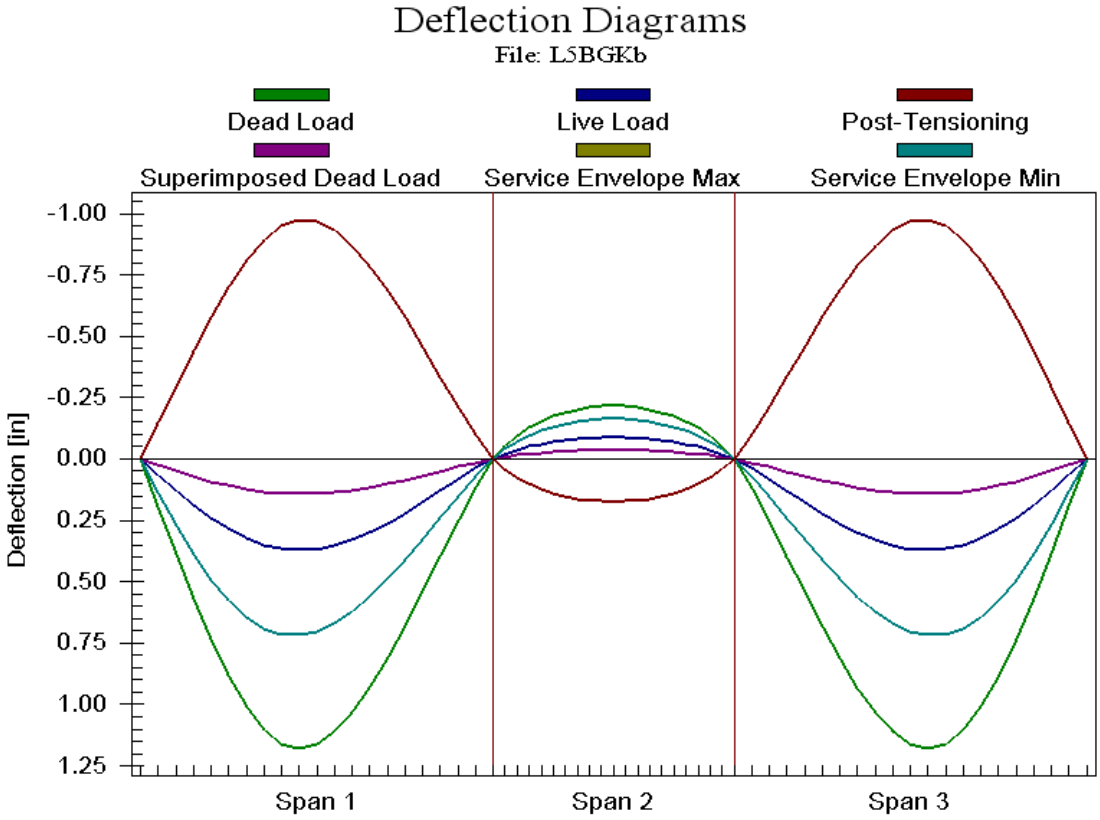


Figure 1 – Office - Grid K with full live loads

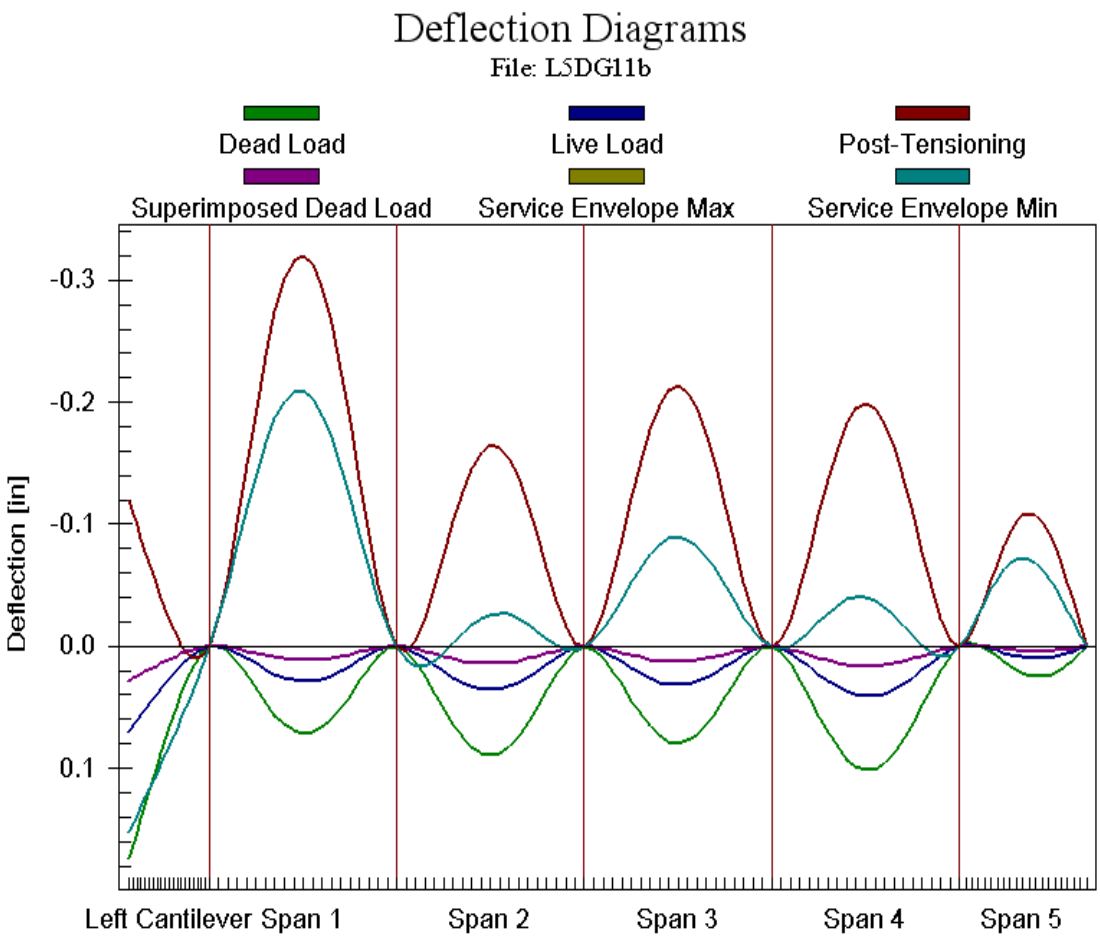


Figure 2 – Office - Grid 11 with full live loads

This ADAPT analysis, however, does not account fully for the measured movement in the slabs. Deflections calculated by the program vary between 1.25” in the transverse direction and -0.7” in the longitudinal direction, including the long term deflection increase of 100%. This is roughly half the measured deflections in the office building which, depending on the datum selected, are often as high as -1.5” in the longitudinal direction and 2.5” in the transverse direction.

Further, Analysis indicates that additional mild steel required to resist loads not supported by post-tensioning is inadequate in several areas, including;

- The tops of slabs at end spans in the longitudinal direction to provide strength against upward failure of the slabs under initial stresses.
- The pour strips due to additional post-tensioning in these areas.
- The transverse bottom steel to resist live and dead tensile forces. This deficiency, however, appears to have been partially corrected during shop drawings and then further strengthening appears to have been added during construction.

- **Bus Mall Slab**

The slab design of the Bus Mall exhibits more severe problems than the office slabs. The Bus Mall was designed for a uniform load of 300 psf. No evidence of rolling loads or point loads was found in our review of the available original analysis.

In the Bus Mall, compressive stresses due to post-tensioning vary between 315 psi and 424 psi. Due to heavy topping and high transit loading, however, even these high stress levels do not balance dead loads and would require significantly more mild reinforcement than provided to resist tensile stresses. Analysis indicates that, in some places, an additional 250% of bottom reinforcement would be required and an additional 500% of top reinforcement.

Figure 3 shows the initial deflections due to various loads for grid L at the Bus Mall Level. (Please see the discussion regarding interpretation of these diagrams under Office Building Slabs section above.) At the Bus Mall level, deflections generally are not an issue. Of more concern are the tensile stress levels, both top and bottom, and the shortening of the slab due to both elastic shortening and creep.

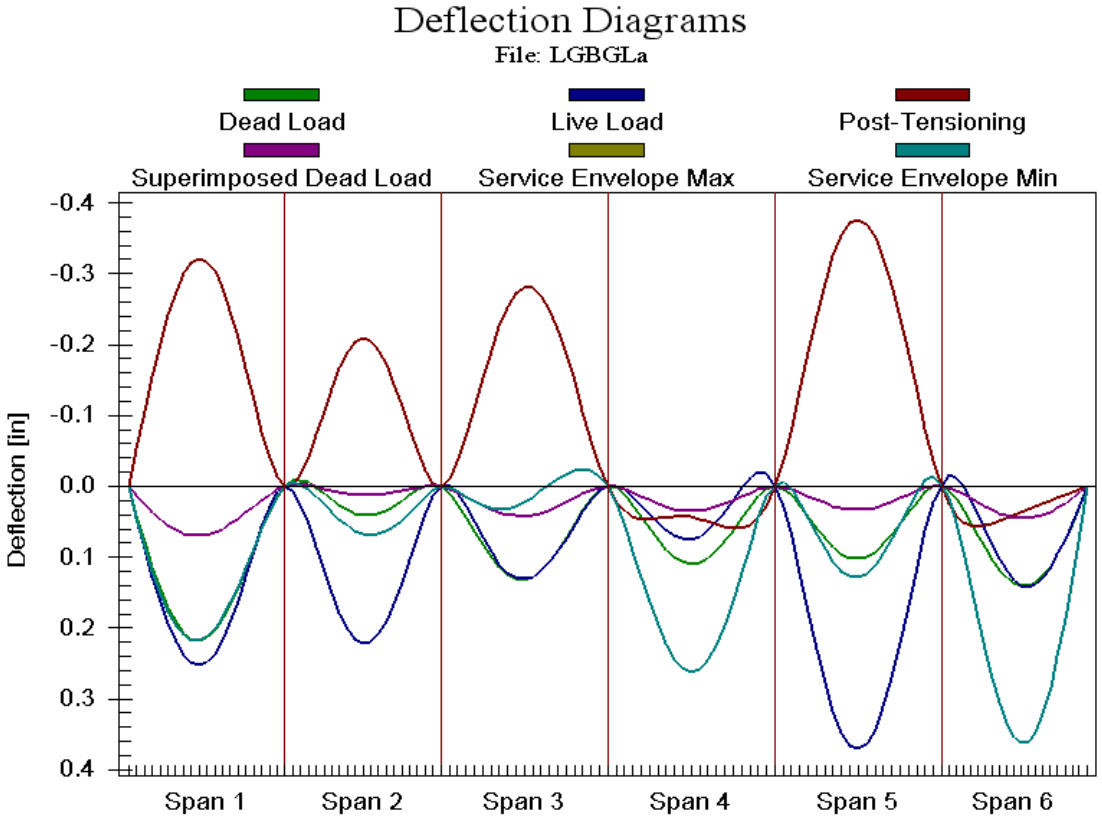


Figure 3 – Bus Mall - Grid L with reduced live loads

For post-tensioned slabs this large it is customary and desirable to provide slip joints to reduce cracking due to compression shortening and creep. A detail for a slip joint between walls and the slab was provided. The location of these joints appeared to be in the corners of the slab edge with the exception of the north wall, where no slip joints could be located using the drawings. While this pattern of joints may be adequate for slabs with moderate compressive stress, it does not appear sufficient to

allow for the movement experienced by this slab due to high compressive stresses. Additionally, there is visual evidence that the joints, as constructed, are not working properly and meeting minutes from construction phase indicate some confusion about the purpose, importance and location of the joints

- **Punching Shear**

ADAPT analysis indicates significant punching shear overstresses in both portions of the complex using the original design drawings.

The fifth floor of the office building is overstressed in punching shear regardless of the shear heads provided. The shear stress calculated in analysis exceeds the maximum allowable under any conditions, whether reinforced or not. The lower floors of the office building do not experience this problem because the columns supporting the slabs are larger lower in the structure.

The Bus Mall, again based on the original design, is overstressed by up to 300% in punching shear. In this large area, nearly all columns are overstressed.

Punching shear is the most significant safety issue found in this analysis.

- **Columns**

Column Strength for the office structure shows overstresses of about 120% below the second floor. The columns in Bus Mall have detailing errors. Here, the ties confining the longitudinal bars are spaced further apart than required for columns not participating in the lateral support of the structure.

Findings

- **Slabs**

Inadequate top and bottom mild steel presents serious strength problems for the Bus Mall structure. The minimal reinforcing provided is not enough to resist live and dead loads in excess of those balanced by the post-tensioning and to assure the safety of the slab under transit loads.

Punching shear is a significant safety problem for the upper floor of the Office and the entire Bus Mall. The importance of satisfactory punching shear resistance cannot be overemphasized. The shear heads located over the columns do not provide the necessary additional strength. In most cases, the calculated punching shear stress exceeds the maximum allowable, whether reinforced or not. Punching shear failure is sudden and could result in collapse of the slabs.

Slab movement and cracking in the Office is a serviceability problem. While overstresses have been calculated, they are most extreme under initial conditions and shortening and creep occurring over the last 11 years should have reduced stresses. Serviceability, while not as serious as safety, has nonetheless rendered most of the interior finishes unusable and floor is seriously out-of-level. Correction of the problem will likely require removal and replacement of the finishes in order to level the slabs.

Slab movement should have ceased for all practical purposes. The very high compressive stresses initially placed in most slabs have resulted in excessive shortening of the slabs. While this may have prolonged movement, the building is well past twice the usual time for most stress-related creep to occur.

Excessive compressive stress is the primary cause of slab movements, cracking at the slab perimeters, movement and cracking at tops of columns, cracks in concrete walls as well as almost all non-structural damage. These effects can be exacerbated by any of the following;

- Elastic shortening
- Creep
- Inadequate reshoring during construction
- Higher than specified water/cement ratios
- Poorly constructed and detailed perimeter slip joints
- Lower than specified concrete strength
- Air entrainment

Elastic shortening and, in particular, creep are the most significant contributors.

Elastic shortening was calculated at between .12" and .16" in the office structure and between .12" and .23" in the Bus Mall, presuming that the concrete design strengths were achieved as specified. This can be compared to about .06" for a typical office slab with a compressive stress of 150 PSI.

This shortening would have been experienced immediately and would, consequently, have been part of both the analyzed and measured deflections noted early in construction.

Concrete Creep is, we believe, the primary cause of continuing movement and damage to both the structural and non-structural portions on the building.

Creep takes place, for the most part, over the first five years of the building's life. This movement would have been highly influenced by compressive stress. We estimate that creep would be about 125% to 180% higher than that experienced by a typical slab with moderate, but adequate, compression. Calculations, assuming specified concrete strength and adequate performance of the pour strips, indicate creep in the office slabs of approximately 1.5" and .5", in the longitudinal and transverse directions, respectively. The Bus Mall creep is estimated to be between 1.1" and 1.5". If, as some of the investigative data from concrete core analysis suggests, (recent in-situ concrete cores predicted a water/cement ratio averaging .5, with a range of between .45 and .55) the concrete strength and Modulus of Elasticity would be reduced and creep could have been greater by an additional 30% to 40%.

The long term deflections determined by the ADAPT program assume a 100% increase in deflection in the first five years. This assumes that creep is the primary cause of long term slab deflection and, therefore, that creep shortening is similar to elastic shortening. Due to the high compressive stress in all portions of the building, these figures clearly do not correlate and long term deflection could be expected to exceed the assumed figure by up to 220%. The combination of these factors explains the high degree of movement and, in particular, the shape of the measured slabs deflections. If the results of recent core testing prove accurate, creep movement could exceed assumptions by up to 350%

The other factors that may exacerbate movement in the slabs are not, in our opinion, significant except to the extent that they affect the elastic shortening and creep. if the building was built with approved concrete mix designs. For instance, the

approved small increase in water/cement ratio will decrease concrete strengths slightly; thus, reducing the Modulus of Elasticity (E) of the concrete a small amount.

The effects of Reshoring are, likewise, of minimal concern since the result of removing the shoring early, or of not reshoring a sufficient number of floors, would have had an effect the opposite of that observed.

Cracking at the slab perimeters of the Bus Mall structure is probably caused by poor construction and location of the wall/slab slip joints and the lack of sufficient mild steel at the slab edges. High compressive stresses greatly increased the amount of movement that needs to be accommodated by the joints. In this case, the location of slip joints is an issue for the north wall of the Bus Mall. Visual evidence as well as questions from the contractor suggests that there may have been a misunderstanding about the purpose, and thus the quality, of these joints. Those observed in the field appeared to be poorly constructed and not functioning properly.

Inadequate mild steel, in light of high compressive stresses, is the primary cause of corner cracking around interior core openings. Some additional mild steel appears to have been added at the corners during the construction process. It could not be confirmed whether these additions were consistent throughout.

- **Columns**

Columns are understrength in the upper floor of the Office. Poor detailing in the Bus Mall reduces their ductility. In order to correct these deficiencies, the columns noted above will require remediation whether understrength or not. The detailing deficiencies, while they do not affect the capacity of the columns, do limit their ability to survive seismic loading.

Numerous wall and column spalls were the subject of discussion between the construction and design teams during the construction phase. For the most part, the spalls were determined to be cosmetic and epoxied for repair. Site visits, ten years later, still showed extensive cracking, particularly in perimeter areas subject to high levels of creep.

- **Walls**

Significant cracks can be readily observed in stairwell and perimeter walls in both the office and Bus Mall portions of the building. In the case of the mall, cracks extend into the general wall areas. The observed cracks are often vertical, higher in the office building, and diagonal in both portions of the structure. This is due, almost entirely, to the shortening of the slabs through creep, and through poor location and failure of the slip joints.

The walls do not appear to be compromised by this cracking, aside from exposing them to corrosion, and additional movement should be minimal. Where spalls are found in conjunction with cracks, they represent a minor fall hazard.

Remediation Strategies

Aside from the demolition and rebuilding of the Square, there is a less intensive strategy the owner's may pursue to retain all or most of the structures. To be sure, this strategy is not inexpensive, but depending on the performance level acceptable to the stakeholder's, this approach should represent a reduced remediation cost compared to demolition and rebuilding. Structurally, the strategy that may be

considered for the entire facility can be described as a Safety and Serviceability approach.

A Safety plus Serviceability approach would correct all deficiencies' crucial to the continued safety of the building. These would include, but not be limited to, improvements to areas with deficient tensile reinforcing, inadequate post-tensioning, poor punching shear resistance, inadequate column strength and lateral strength. In addition, as many serviceability problems as possible would be corrected. These may include; leveling slabs, correction of locked slip joints at the building perimeter, repair of slab, column and wall cracks, and the addition of tensile reinforcing membranes in areas with inadequate resistance to initial forces.

Conclusion

It is our opinion that the critical failure in the design and construction process lay with the original design. The engineer of record appears not to have possessed adequate experience with this building type and/or scale. This resulted in an incomplete set of design documents and a design which contains numerous non-conforming design elements, many of which threaten safety. The engineer of record bears the responsibility for this work.

Based on our review of both the design and construction phase documents, we believe that the engineer did not meet the professional Standard of Care, if that standard is defined as:

"In performing professional services for a client, a (structural engineer) has the duty to have that degree of learning and skill ordinarily possessed by reputable (structural engineers), practicing in the same or similar locality and under similar circumstances. It is (the structural engineer's) further duty to use the care and skill ordinarily used in like cases by reputable members of the (structural engineering) profession practicing in the same or similar locality under similar circumstances, and to use reasonable diligence and (the structural engineer's) best judgment in the exercise of professional skill and in the application of learning, in an effort to accomplish the purpose for which (the structural engineer) was employed. A failure to fulfill any such duty is negligence" (BAJI, 1986)

Problems with the original design were compounded by the numerous revisions to the design during construction. Many of which appear to constitute completing the design during construction. Some problems corrected during design were significant and, if not discovered, would have lead to additional performance and safety issues. The doubling of transverse mild reinforcement and the clarification of column tie spacing in the office structure are examples.

Additionally, there were several changes in the engineer's supervising the project during the design and construction process. This could have led to gaps and inconsistencies' in the design and construction process.

Construction problems include lack of communication, concrete quality and poor construction practices, but, again, inexperience appears to play a role. Questions over the purpose of perimeter slip joints, failure to question the cause and correction of the many spalls and cracks noted during construction illustrate this point.

End of Memo

APPENDIX F
REQUESTS FOR INFORMATION

PENCE/KELLY
CONSTRUCTION, INC.

2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8681 Fax (503) 585-7477
CCB # 63435

Request for Information

RFI No. 00018

TO: Leonard Lodder

Arbuckle Costic Architects
363 State Street S.E.

Salem, OR 97301-3533

DATE: 3/11/99

JOB: 99006

ISSUE No.:

Project: Courthouse Square

Subject: Area drains on A1.2.12

Please process and return by no later than 3/18/99

Question

Spec. Ref.

Dwg. Ref. #

Area drains on A1.2.12 on grid lines conflict with PT cables, Please clarify.

Signed: John Gremmels

Response

By:

Firm:

Date:

MOVE 3 AREA DRAINS 4ft DIRECTLY WEST.
ON GRID LINES 1 @ 8;9
G @ 4&5
E @ 4&5.

By:

Date: 03/16/99

CC:

PENCE/KELLY
CONSTRUCTION, INC.
17417 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8661 Fax (503) 585-7477
CCB # 69436

Request for Information

TO: Leonard Lodder
Arbuckle Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

RFI No. 00034

DATE: 3/15/99

JOB: 99006

ISSUE No.:

Project: Courthouse Square

Subject: ColumnSchedule

Please process and return by no later than 3/22/99

Question	Spec. Ref.	Dwg. Ref. #

Please provide a column schedule from the ground floor to roof for C16 columns on grid O, 10A-11-12-12A..

Signed: John Grammels

Response By: Tim Terich Firm: CWEC Date: 3.26.99

ARBUCKLE COSTIC REC'D 03/25/99

1) COLUMN'S O-11 & O-12 SHOULD BE COLUMN TYPE C10 (WITH SEISMIC TIES)

2) COLUMN O-10A & O-12a TERMINATE @ GROUND FLOOR

By: [signature] Date: 3.26.99

cc: CRAIG LEWIS, MMDC.
Pro Management Systems, Inc.

3828.15a

PENCE/KELLY
CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-9681 Fax (503) 585-7477
CCB # 63435

Request for Information

RFI No. 00059

TO: Leonard Lodder
Arbuckle Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

DATE: 3/18/99
JOB: 99006
ISSUE No.:

Project: Courthouse Square
Subject: Column on grid J-10a.
Please process and return by no later than 3/25/99

Question	Spec. Ref.	Dwg. Ref. #

The Column on grid J-10a. sheet S2.1.1 Is called out as a C6. Per 3/16/99 meeting, it should be C16.

Signed: John Grommels

Response **By:** Tim Terrell **Firm:** CWEC **Date:**

CORRECT.

By: [signature] **Date:** 3.26.99

CC: CRAIG LEWIS. WMDC

Pro Management Systems, Inc.

3838-15a

PENCE/KELLY
CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8681 Fax (503) 585-7477
CCB # 63435

Request for Information

RFI No. 00076

TO: Leonard Lodder
Arbuckle Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

DATE: 3/19/99
JOB: 99006
ISSUE No.:

Project: Courthouse Square
Subject: Time Between Pours
Please process and return by no later than 3/26/99

Question

Spec. Ref.

Dwg. Ref. #

Spec. 03300.7 - 3.3.1.E calls for a minimum time between pours and adjacent pours - 10 days; between control joints - 6 days; between expansion joints - 1 day. Please review this requirement, we believe it to be unrealistic.

Signed: John Grammels

Response

By: Tim Terrell **Firm:** CWEC **Date:**

THIS IS CONSERVATIVE. PLEASE USE ACI STD. PRACTICE RECOMMENDATIONS. PLEASE SUBMIT YOUR FINDINGS FOR REVIEW.

By: [signature] **Date:** 3.26.99

CC: CRAIG LEWIS, MMDC.

Pro Management Systems, Inc.

9828.15a

PENCE/KELLY
CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8681 Fax (503) 585-7477
CCB # 63435

Request for Information

TO: Leonard Lodder
Arbuckle Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

RFI No. 00084
DATE: 3/19/99
JOB: 99006
ISSUE No.:

Project: Courthouse Square
Subject: Column Schedule
Please process and return by no later than 3/26/99

Question	Spec. Ref.	Dwg. Ref. #

The column schedule on sheet S1.1.2 calls out #3's @ 12" O.C. Detail 19/S8.1.1 calls out #3's @ 3" O.C. Please clarify.
(3" O.C. was indicated in 3/16/99 meeting.)

Signed: John Gremmels

Response By: Tim Terich Firm: CWEC Date: 3.25.99

NEW CODE REQUIRES ADDITIONAL TIES @ COLUMN BASES & AT SLAB CONNECTIONS.

DETAILS 18 + 19 ON S8.1.1. PROVIDE A SCHEDULE FOR ADDITIONAL TIE REQUIREMENTS - SPECIFYING NUMBER, SPACING & LOCATION. THESE COLUMNS ARE DENOTED WITH AN ASTERICKS* ON S1.1.1. OTHERWISE, REFERENCE COLUMN SCHEDULE FOR TIE SPACING.

By: Date: 3.25.99

CC: CRAIG LEWIS, MMDC.

9828.15a
ACA033358

PENCE/KELLY
CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8681 Fax (503) 585-7477
CCB # 63435

Request for Information

TO: Leonard Lodder

Arbuckle Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

RFI No. 00102

DATE: 3/24/99

JOB: 99006

ISSUE No.:

Project: Courthouse Square

Subject: Edge of Slab

Please process and return by no later than 3/31/99

Question	**Spec. Ref.**	**Dwg. Ref. #**

On drawing 4/A3.4.4, what is the dimension to the edge of slab?

Signed: John Gremmels

Response	**By:**	**Firm:**	**Date:**

SEE ATTACHED DRAWING SD-010 WHICH SHOWS SLAB EDGE CONDITIONS AT BAY WINDOWS AND CURTAIN WALL LOCATIONS ON 3RD & 4TH FLOOR.

By: Leonard Lodder **Date:** 03/26/1999

CC: CRAIG LEWIS, MMDC

PENCE/KELLY
CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 588-7223
Portland (503) 224-6681 Fax (503) 585-7477
CCB # 69498

Request for Information

TO: Leonard Lodder
Arbuckle Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

RFI No. 00120
DATE: 3/31/99
JOB: 99006
ISSUE No.:

Project: Courthouse Square
Subject: Column C-22
Please process and return by no later than 4/7/99

Question	Spec. Ref.	Dwg. Ref. #

Columns on grid 0-10 on Sheet S2.1.1 are called out as C-22 Columns. Schedule shows columns stopping @ the Parking Floor. Please verify. (Columns goes from ground floor to the Roof.)

Signed: John Gremmels

Response	By: JMO	Firm: CWEC	Date: 4-6-99

COLUMNS SHOWN @ 0-10 SHOULD BE CONSTRUCTED AS C-22. 12"x14" COLUMN.

By: [signature] Date: 4-6-99
cc: Craig Lewis, MMDC

9828.15a

8

PENCE/KELLY CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-9881 Fax (503) 585-7477
CCB # 62436

Request for Information

TO: Leonard Lodder
Arbuckle Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

RFI No. 00130

DATE: 4/2/99

JOB: 99006

ISSUE No.:

Project: Courthouse Square

Subject: C-16 column termination S2.3.4

Please process and return by no later than 4/9/99

Question

Spec. Ref.

Dwg. Ref. # S2.3.4

On sheet S2.3.4, Dawings shows shear heads on grid from C to O at grid 10a to 12A. C-16 columns terminate at ground level. Is this drawing correct?

Signed: John Gremmels

Response

By: Tim Terzich **Firm:** CWEC **Date:** 4/19/99

YOU ARE CORRECT. THERE ARE NO COLUMNS SUPPORTING THE 2ND FLR SLAB. THEREFORE, PLS IGNORE THE COLUMNS SHEAR HEADS ON #2.3.4 ALONG GRIDS 10A + 12A

By:

Date: 4/19/99

cc: Craig Lewis, MMDC
Pro Management Systems, Inc. CARLSON

9828.15a

PENCE/KELLY CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8681 Fax (503) 585-7477
CCB # 69495

Request for Information

TO: Leonard Lodder
Arbuckle Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

RFI No. 00134
DATE: 4/5/99
JOB: 99006
ISSUE No.:

Project: Courthouse Square
Subject: Col. Base Plate Anchorage
Please process and return by no later than 4/12/99

Question Spec. Ref. Dwg. Ref. # S7.12

Please clarify column base plate anchorage. A3.4.12 details conflict with S7.12.

Signed: John Grommala

Response By: J. DHANENS Firm: CWEC Date: 4-19-99

FOLLOW STRUCTURAL DETAIL
1/S7.1.2

T3

By: [signature] Date: 4-19-99

cc: Craig Lewis, MMDC
Pro Management Systems, Inc. CARLSON

PENCE/KELLY
CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8681 Fax (503) 585-7477
CCB # 63435

10

Request for Information

TO: Leonard Lodder
Arbuckle Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

RFI No. 00145

DATE: 4/7/99

JOB: 99006

ISSUE No.:

Project: Courthouse Square

Subject: Shearwall dimension at SW stairs

Please process and return by no later than 4/14/99

Question

Spec. Ref.

Dwg. Ref. # A7.1

Please clarify the Shearwall dimension at SW stairs next to elevator #1 on 1/A7.1. The architectural drawing calls it as 18", the structural calls for 20".

Signed: John Gremmels

Response

By:

Firm:

Date:

20" AS NOTED ON DETAIL 3.

Upon receipt of this RFI you must notify Pence/Kelly within 2 days, whether the RFI is a no cost change, or an extra to your contract. Additional costs must be submitted within 10, days of receipt.

By:

Date: 04/08/99

cc: Craig Lewis, MMDC

Pro Management Systems, Inc.

9828.15

ACA033270

PENCE/KELLY
CONSTRUCTION, INC.
2747 Ponca Loop SE, Salem, OR 97302 (503) 399-7228
Portland (503) 224-0101 Fax (503) 585-2477
OCB # 69345

Request for information

TO: Leonard Lodder
Arbuckle Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

RFI No. 00162

DATE: 4/15/99

JOB: 99006

ISSUE No.:

Project: Courthouse Square

Subject: Columns @ grids 10A &12A, D-N

Please process and return by no later than 4/22/99

Question Spec. Ref. Dwg. Ref. # S2.3.1

Columns appear @ grids 10A &12A, D-N, ground floor to 2nd floor, on sheets S2.3.1, the column schedules calls for those columns to end at the ground floor. Please clarify. See A2.3.1

Signed: John Grammala

Response By: Tim Terrich Firm: CWEC

Date:

THESE COLUMNS DO NOT SHOW UP ON GROUND FLOOR. TIM PLEASE CONFIRM.

COLUMNS SHOULD TERMINATE @ GRND FLR. 3

Upon receipt of this RFI you must notify Pence/Kelly within 2 days, whether the RFI is a no cost change, or an extra to your contract. Additional costs must be submitted within 10, days of receipt.

By: [signature] Date: 4/19/99

cc: Craig Lewis, MMDC
Project Management Systems, Inc. Carlson

Page 1 of 1

APR-18-99 MON 08:38 ARBUCKLE COSTIC ARCH INC FAX NO. 5035813655 P. 02/03

9828-15a.

PENCE/KELLY
CONSTRUCTION, INC.
3747 Parma Loop NE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-0491 Fax (503) 399-7477
CCB # 53495

Request for Information

TO: Leonard Lodder
Arbucide Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

RFI No. 00163
DATE: 4/15/99
JOB: 99006
ISSUE No.:

Project: Courthouse Square
Subject: Columns @ grids 10A &12A, O-line
Please process and return by no later than 4/22/99

Question	Spec. Ref.	Dwg. Ref. # S2.2.1

C16 columns appear @ grids 10A &12A, O-line, ground floor to 2nd floor, 2.3.1, see sheet A2.2.1. Do these columns reach the 2nd flr slab and if so please provide schedule.

Signed: John Grammatis

Response By: Tim Terzich Firm: CWEC

Date: 4/19/99

COLUMNS TERMINATE @ GRD FLR.
DRAWING ON S2.3.1 & S2.3.4 INCORRECTLY SHOW COLUMNS BELOW.

Upon receipt of this RFI you must notify Pence/Kelly within 2 days, whether the RFI is a no cost change, or an extra to your contract. Additional costs must be submitted within 10, days of receipt.

By: _____ Date: 4/19/99

cc: Craig Lewis, MMDC
Pro Management Systems, Inc. Carlson

Page 1 of 1

APR-19-99 MON 08:37 ARBUCKLE COSTIC ARCH INC FAX NO. 5036813855 P.03/03

9828.15a

PENCE/KELLY
CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8681 Fax (503) 588-7477
CCB # 63495

Request for Information

TO: Leonard Lodder
Arbuckle Costic Architects
363 State Street S.E.
Salem, OR 97301-3533

RFI No. 00176
DATE: 4/20/99
JOB: 99006
ISSUE No.:

Project: Courthouse Square
Subject: Dimensions on 2/S4.1.3
Please process and return by no later than ~~4/27/99~~ 4/20/99

Question

Spec. Ref.

Dwg. Ref. # S4.1.3

Per phone between Steve Schaad and Tim Terrich on dimensions on 2/S4.1.3 please confirm;
- Grid 11-12 is changed from 28'-4" to 26'
- Dimension of 13'-10" is changed to 11'-6"
- Grid 12 to edge of mat footing is changed from 16'-10" to ~~17'-2"~~ 19'-2" ℄

Signed: John Gremmels

Response

By:

Firm:

Date:

OK AS REVISED ABOVE.

Upon receipt of this RFI you must notify Pence/Kelly within 2 days, whether the RFI is a no cost change, or an extra to your contract. Additional costs must be submitted within 10, days of receipt.

By: Leonard Lodder **Date:** 04/20/99

cc: Craig Lewis, MMDC

9828.159

APPENDIX G
DESIGN FEE COMMUNICATION BETWEEN ARBUCKLE COSTIC ARCHITECTURE AND BILLY WASSON DATED FEBRUARY 16, 1999

2. On Contract Administration and Construction Review, calculate the fee at 6% x 20% = 1.2% of the awarded construction contract to Pence/Kelly.

Thank you in advance for your consideration.

Sincerely,

Alan E. Costic, A.I.A.
Architect

Leonard Lodder, A.I.A.
Architect

LL:as

cc: John Whittington, Salem Area Mass Transit
Craig Lewis, Melvin Mark Development Company.

9828.1A

APPENDIX H
CHANGE ORDER REQUESTS FROM PENCE/KELLY

PENCE/KELLY CONSTRUCTION, INC.
2747 Pence Loop SE, Salem, OR 97302 (503) 399-7223
Portland (503) 224-8681 Fax (503) 585-7477
CCB # 63435

Change Order Request

TO: Craig Lewis
Melvin Mark Companies
111 Southwest Columbia
Portland, OR 97201

COR No. 00102
DATE: 9/10/99
JOB: 99006
ISSUE: 00196

Project: Courthouse Square
COR Title: Over excavation take 4

1. Contract time being extended ( ) Calendar days.
2. Acceptance of COR prior to our deadline date of (9/17/99)

For work described below, we offer the following quotation.

Provide over-excavation per the following back-up documentation.

Total Cost: $33,688

Accepted By: _____ Pence/Kelly Construction, Inc. - Dave Hays
Date: 9.10.99

Reviewed By: _____ Melvin Mark Companies - Craig Lewis
Date:

Accepted By: _____ Salem Area Transit - John Wittington
Date: _____

Accepted By: _____ Marion County - Billy Wasson
Date: _____

9828.11a

ACA024520

Pence Kelly Construction, Inc.

Cost Estimate Summary

Project: Courthouse Square
Location: Salem, Oregon
Issue: 60196 over excavation late 4

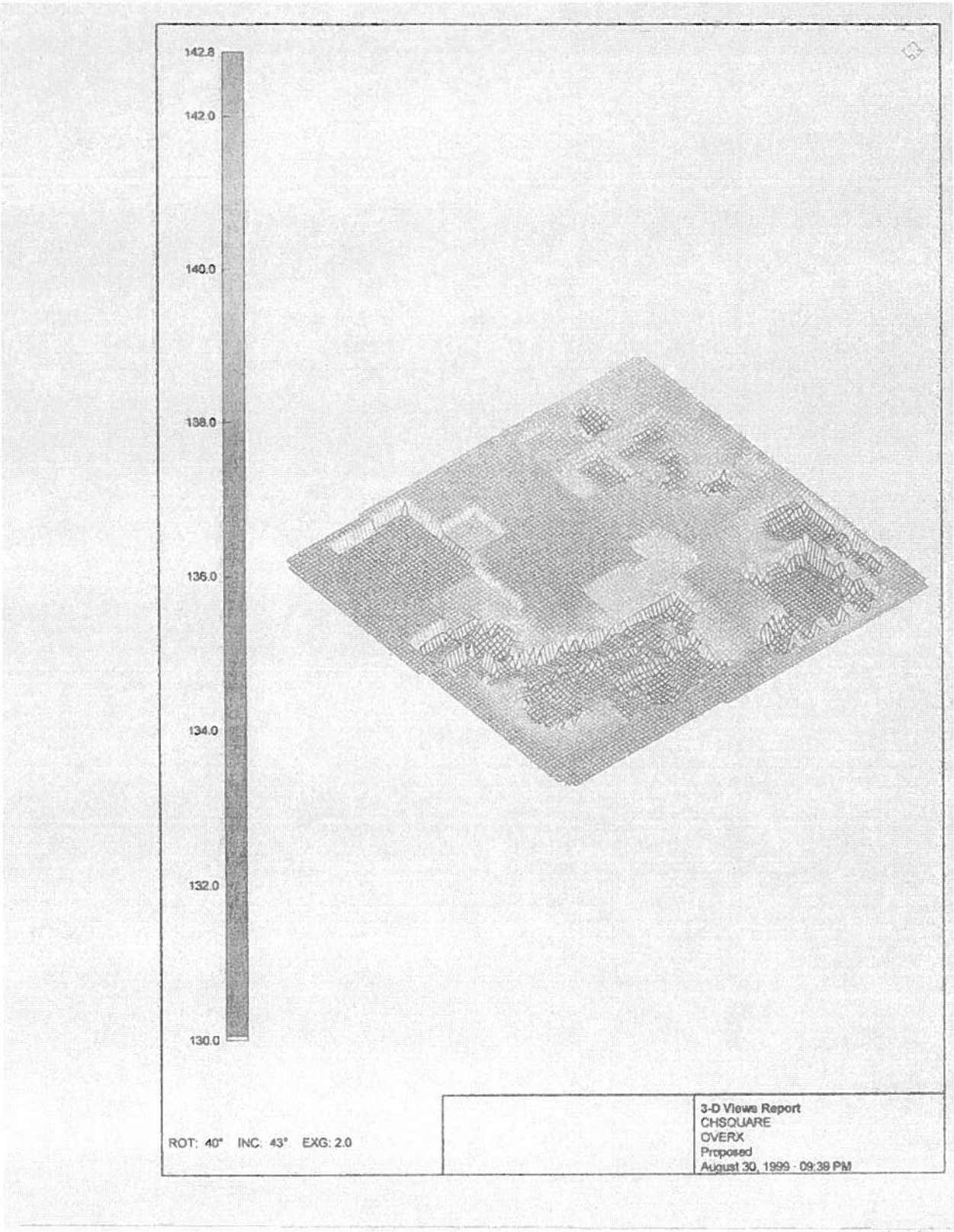
Job No.: 9906
Estimator: DH
Print Date: 10-Sep-99
COR #: 102

DESCRIPTION	QTY	UNIT	MH/UNIT	LABOR HR	$/HR	LABOR COST	COMPACTION %	$/UNIT MAT	MAT COST	SUB $/UNIT	SUB $	EQP.$/UNIT	EQUIP.$
				0		$ -			$ -		$ -		$ -
Area #11 total excavation	284.90	CY		0		$ -	30%	$ 35.00	$ 12,053		$ -		$ -
Area #12 total excavation	149.01	CY		0		$ -	30%	$ 35.00	$ 6,780		$ -		$ -
Area #11/#12 concrete	(9.79)	CY		0		$ -	30%	$ 35.00	$ (445)		$ -		$ -
				0		$ -			$ -		$ -		$ -
Area #13 total excavation	255.59	CY		0		$ -	30%	$ 35.00	$ 11,629		$ -		$ -
Area #13 concrete	(15.09)	CY		0		$ -	30%	$ 35.00	$ (686)		$ -		$ -
				0		$ -			$ -		$ -		$ -
Area #14 total excavation	102.55	CY		0		$ -	30%	$ 35.00	$ 4,666		$ -		$ -
Area #14 concrete	(6.78)	CY		0		$ -	30%	$ 35.00	$ (308)		$ -		$ -
				0		$ -			$ -		$ -		$ -
				0		$ -			$ -		$ -		$ -
				0		$ -			$ -		$ -		$ -
				0		$ -			$ -		$ -		$ -
				0		$ -			$ -		$ -		$ -
				0		$ -			$ -		$ -		$ -
				0		$ -			$ -		$ -		$ -
				0		$ -			$ -		$ -		$ -
TOTALS				0		$ -			$ -		$ -		$ -
								Total Value	$33,688				

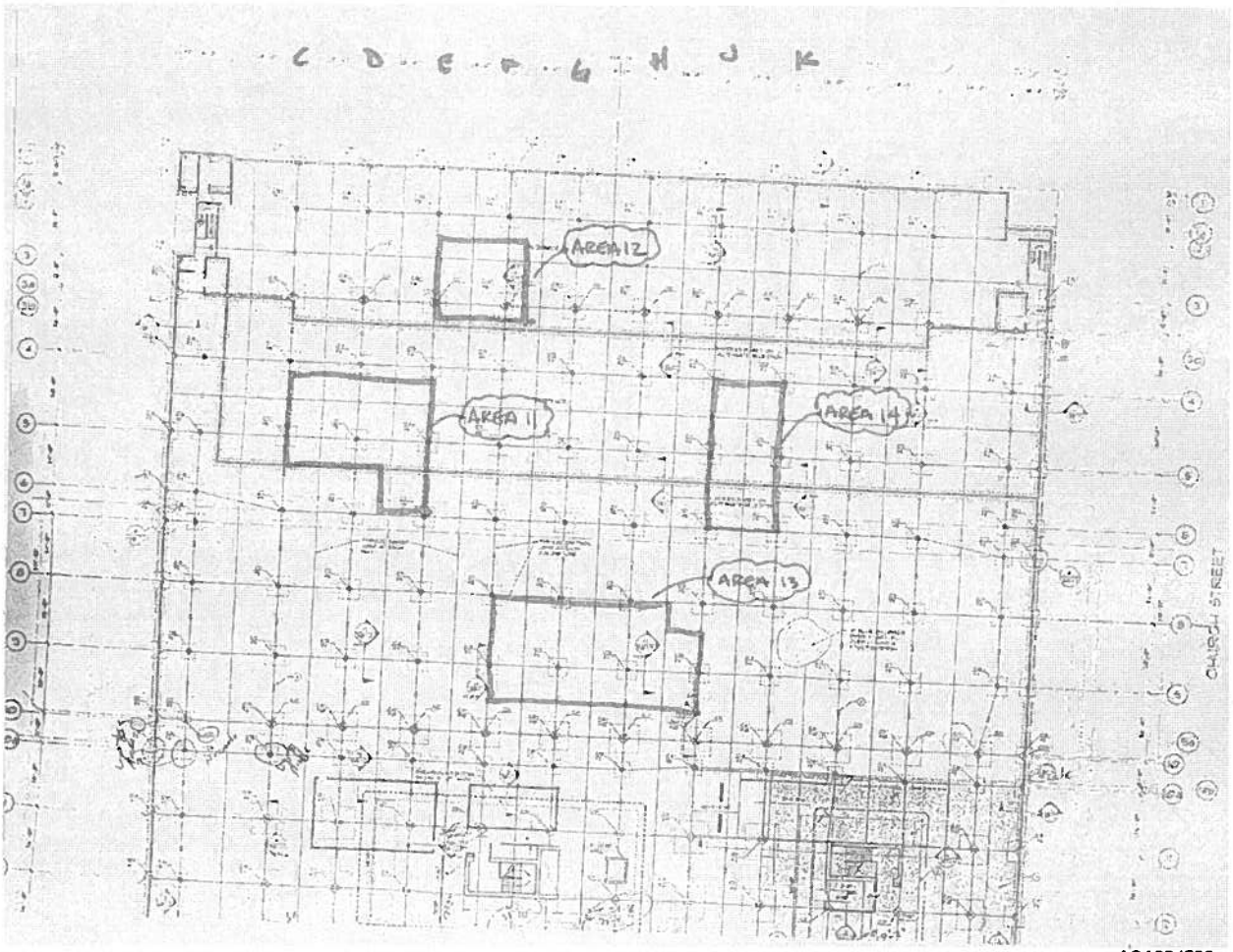
Portion related to contaminated soil

COR #88	359.45	CY		0		$ -	30%	$35	$ 16,355		$ -		$ -
				0		$ -			$ -		$ -		$ -
								Total Value	$ 16,355				

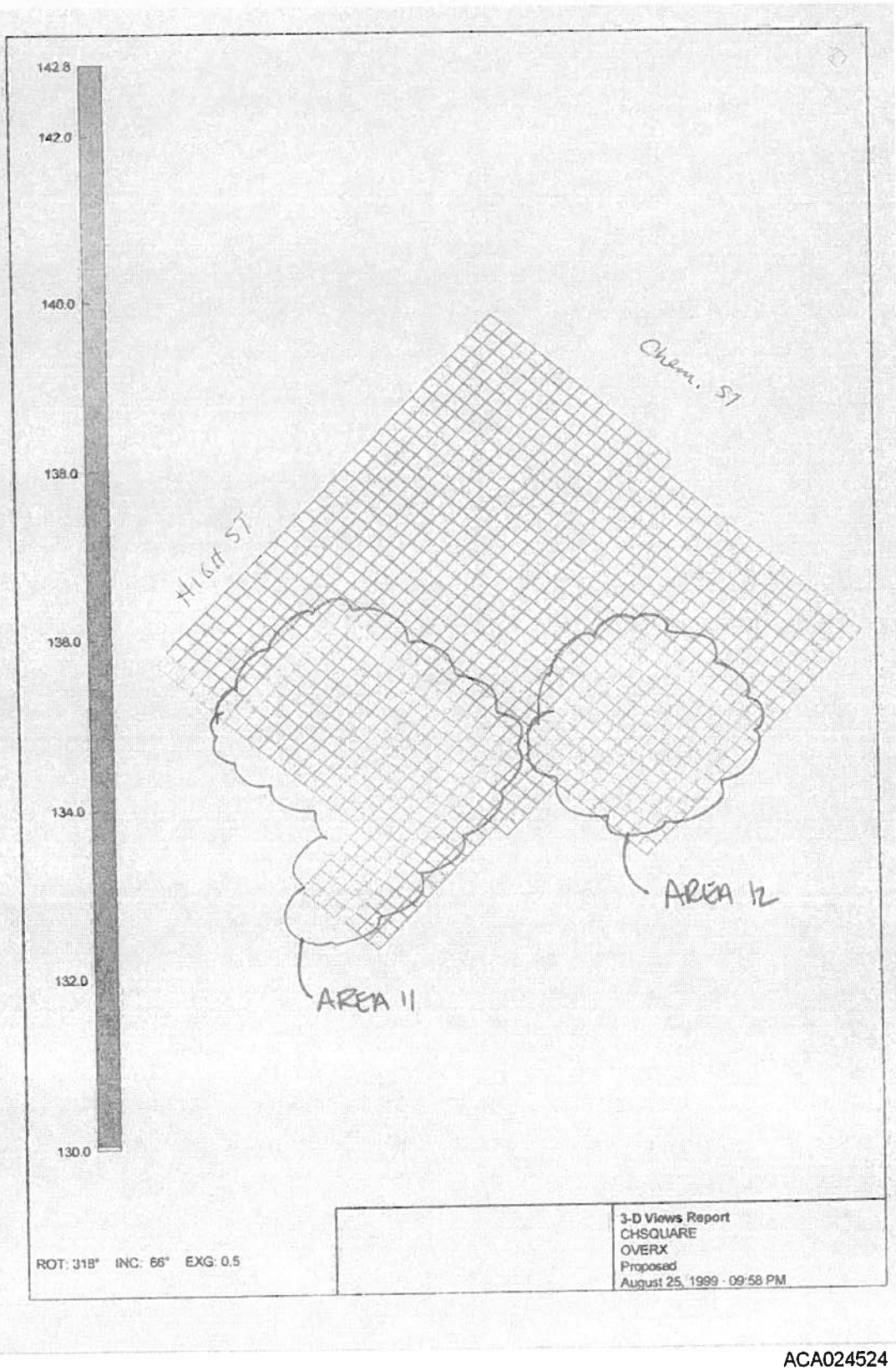
ACA024521


142.8
142.0
140.0
138.0
136.0
134.0
132.0
130.0
ROT: 40° INC: 43° EXG: 2.0
3-D Views Report
CHSQUARE
OVERX
Proposed
August 30, 1999 - 09:38 PM

ACA024522



ACA024523


142.8
142.0
140.0
138.0
136.0
134.0
132.0
130.0
Chem. ST
High ST
AREA 12
AREA 11
ROT: 318° INC: 66° EXG: 0.5
3-D Views Report
CHSQUARE
OVERX
Proposed
August 25, 1999 - 09:58 PM

ACA024524

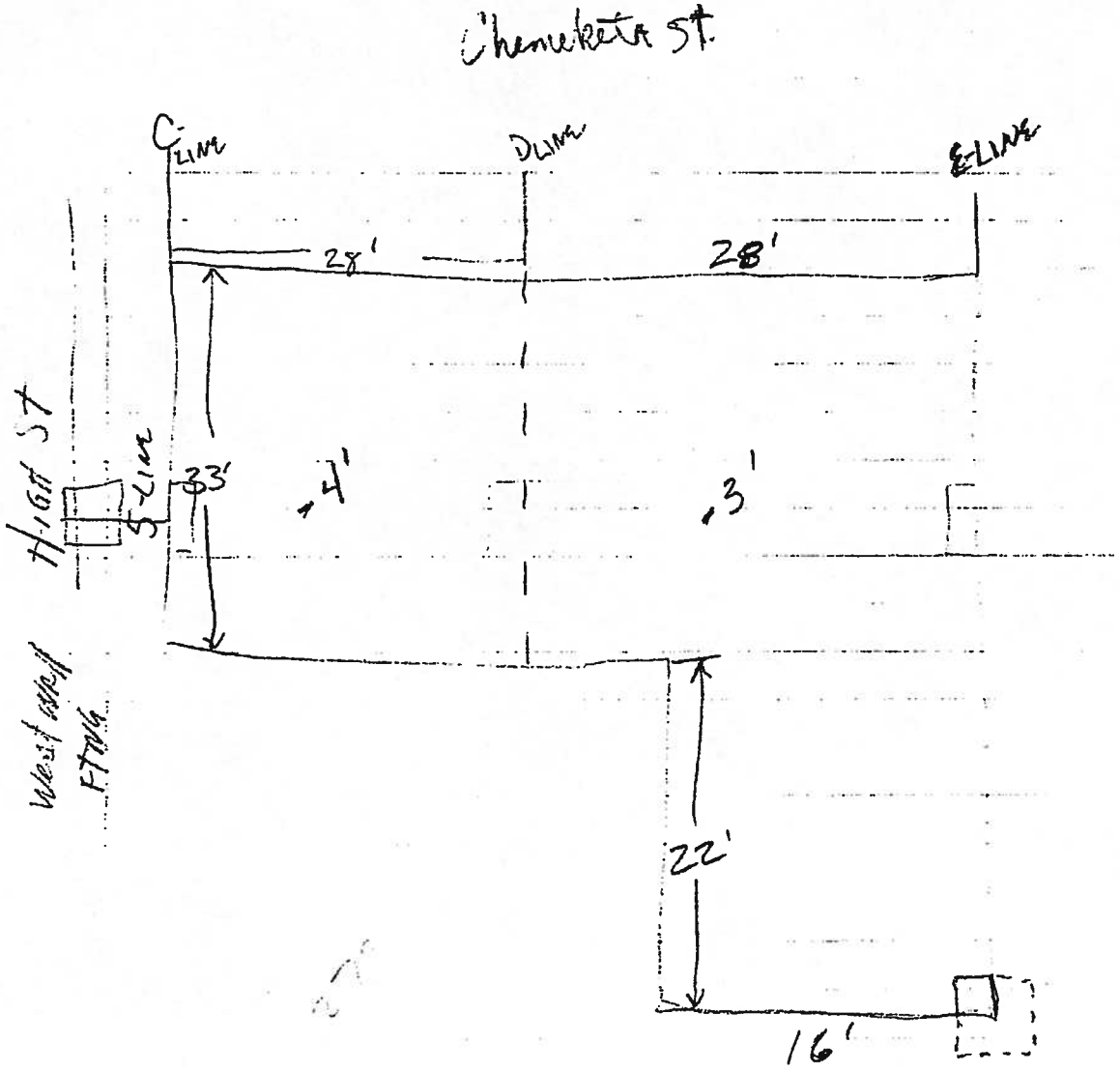
Project Summary Report
CHSQUARE

September 09, 1999

	Data Type	Elevation (ft)	Thickness (ft)	Boundary (ft)	Area (sq ft)	Volume (cu yd)
Drawings: OVERX; ramp						
0-x						
k1	STR	141.84	3.00	164.99	1159.62	128.85
k2	STR	142.34	4.00	121.94	918.34	136.05
TOTALS: 0-x				286.94	2077.96	264.90

Project Totals for Material Groups

0-x				286.94	2077.96	264.90


Chemeketa St.
C-LINE
D-LINE
E-LINE
28'
28'
33'
4'
3'
22'
16'
N. 16th ST
S-Line
West side of FTMG

Project Summary Report
CHSQUARE

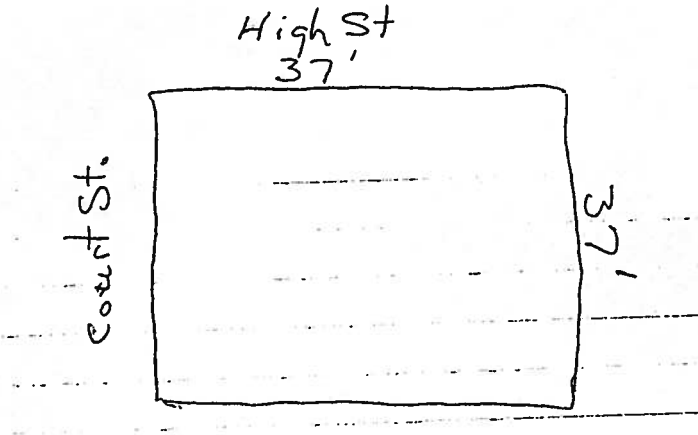
September 09, 1999

	Data Type	Elevation (ft)	Thickness (ft)	Boundary (ft)	Area (sq ft)	Volume (cu yd)
Drawings: OVERX; 37						
0-x						
k3	STR	141.84	3.00	152.94	1341.13	149.01
TOTALS: 0-x				152.94	1341.13	149.01

Project Totals for Material Groups			
0-x	152.94	1341.13	149.01

8-5-94

Line E to Line G Over X
Grid 2 to 4 average dept. 3'



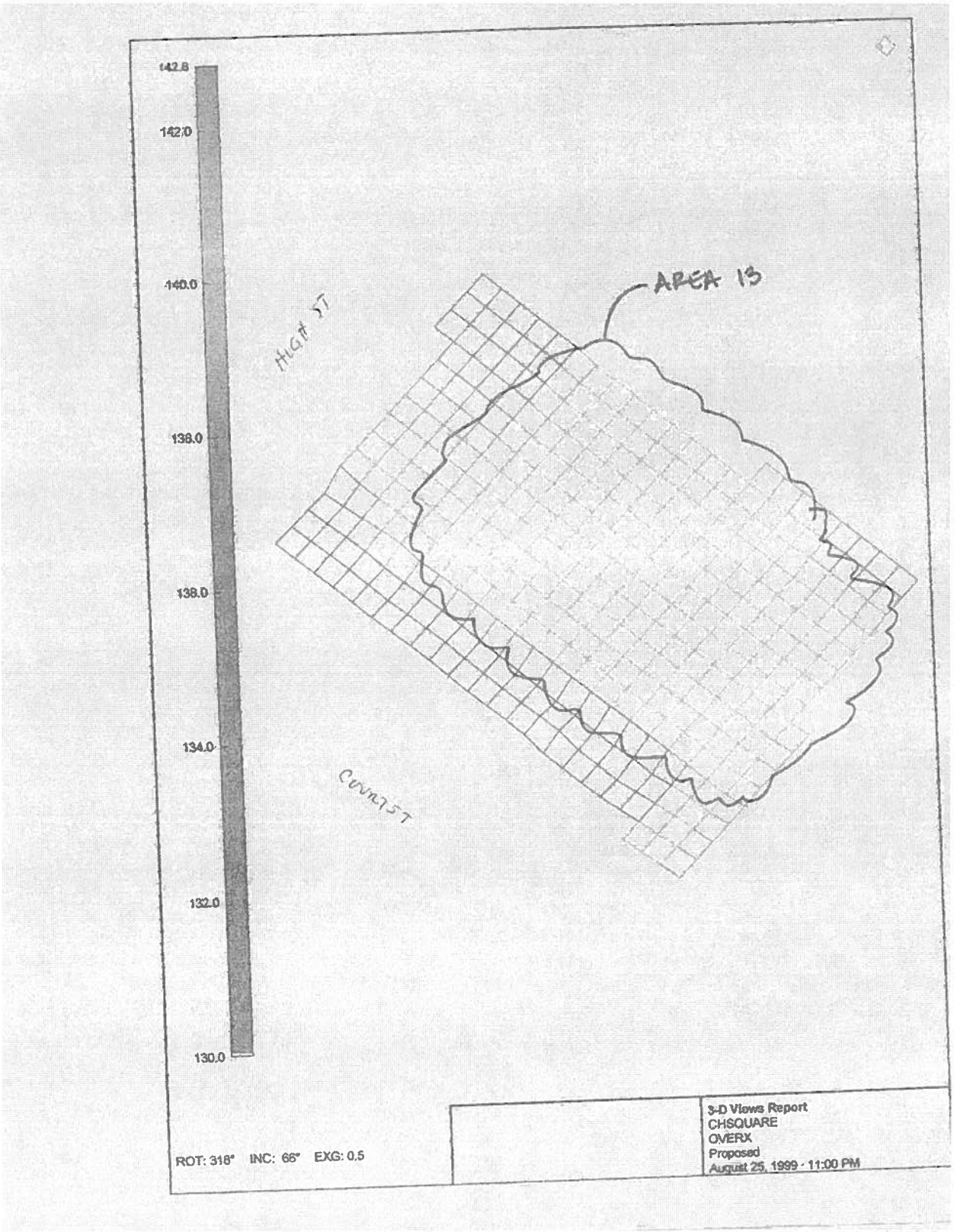
15²

Project Summary Report
CHSQUARE

August 25, 1999

	Data Type	Elevation (ft)	Thickness (ft)	Boundary (ft)	Area (sq ft)	Volume (cu yd)
Drawings: OVERX; tf14						
concrete						
tf1	STR	142.34	2.00	29.51	34.04	2.52
tf2	STR	142.34	2.00	31.41	55.77	4.13
tf3	STR	141.84	2.00	23.82	30.35	2.25
tf4	STR	141.84	2.00	13.85	12.00	0.89
TOTALS: concrete				98.59	132.16	9.79

Project Totals for Material Groups						
concrete				98.59	132.16	9.79


142.8
142.0
140.0
138.0
138.0
134.0
132.0
130.0
AREA 13
HIGH ST
CUMMINGS ST
ROT: 318° INC: 66° EXG: 0.5
3-D Views Report
CHSQUARE
OVERX
Proposed
August 25, 1999 - 11:00 PM

ACA024530

Project Summary Report
CHSQUARE

August 25, 1999

	Data Type	Elevation (ft)	Thickness (ft)	Boundary (ft)	Area (sq ft)	Volume (cu yd)
Drawings: OVERX; LC11						
0-x						
lc1	STR	142.84	2.50	225.77	2760.33	255.59
TOTALS: 0-x				225.77	2760.33	255.59

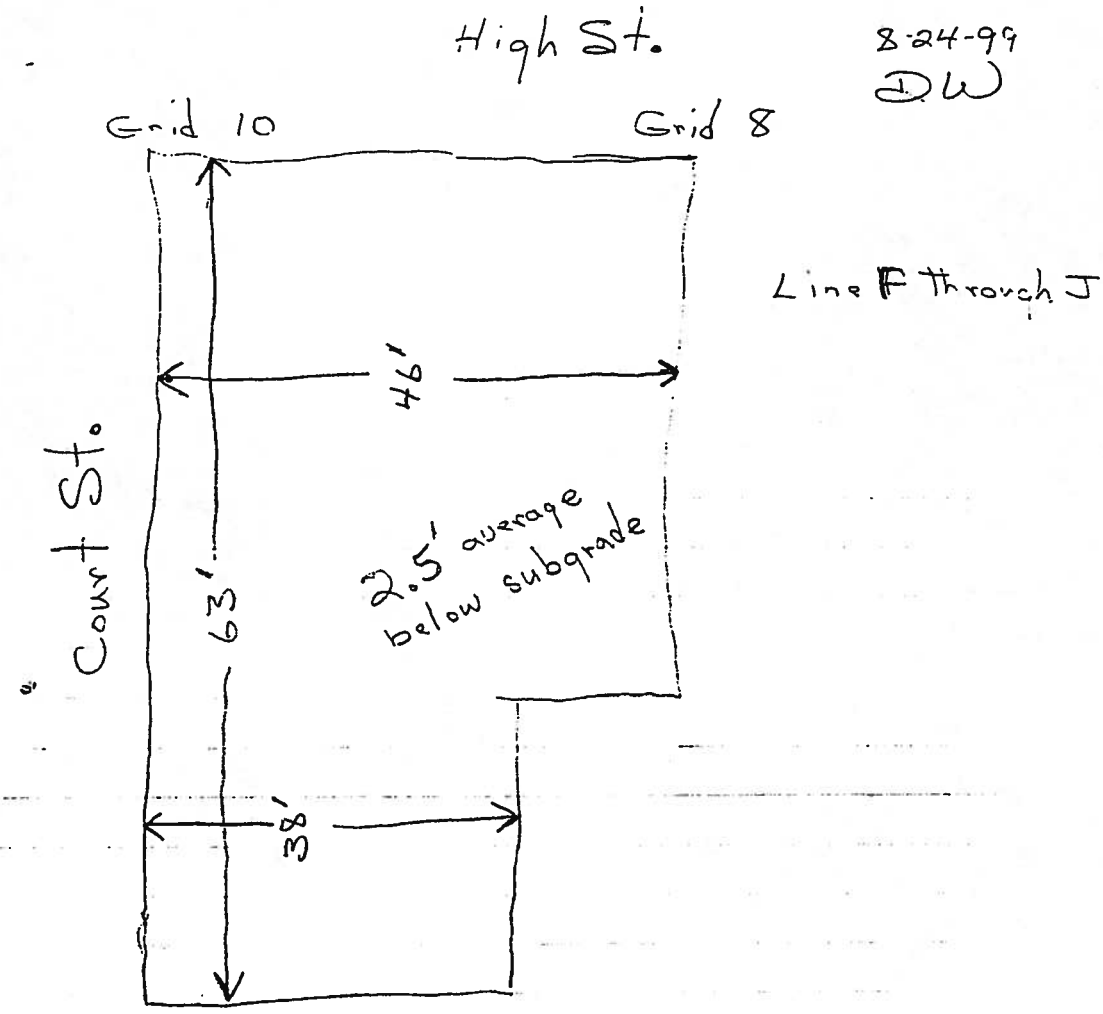
Project Totals for Material Groups						
0-x				225.77	2760.33	255.59

Project Summary Report
CHSQUARE

August 25, 1999

	Data Type	Elevation (ft)	Thickness (ft)	Boundary (ft)	Area (sq ft)	Volume (cu yd)
Drawings: OVERX; LC11						
concrete						
kc1	STR	142.84	2.00	27.85	43.67	3.23
kc2	STR	142.84	2.00	30.33	50.13	3.71
kc3	STR	142.84	2.00	30.39	55.77	4.13
kc4	STR	142.84	2.00	29.38	54.08	4.01
TOTALS: concrete				117.95	203.64	15.08

Project Totals for Material Groups						
concrete				117.95	203.64	15.08


High St.
8-24-99
DW
Grid 10
Grid 8
Line F through J
46'
63'
Court St.
2.5' average
below subgrade
38'

Project Summary Report
CHSQUARE

August 30, 1999

	Data Type	Elevation (ft)	Thickness (ft)	Boundary (ft)	Area (sq ft)	Volume (cu yd)
Drawings: OVERX; last						
0-x						
lc1	STR	142.84	2.50	46.08	8.36	0.77
d1	STR	142.34	2.00	119.08	884.80	65.54
d2	STR	142.34	3.00	81.05	326.12	36.24
TOTALS: 0-x				246.21	1219.28	102.55

Project Totals for Material Groups

0-x				246.21	1219.28	102.55

APPENDIX I
REQUEST FOR ADDITIONAL FEES BY CENTURY WEST ENGINEERING

CENTURY WEST
ENGINEERING CORPORATION

LEADING THROUGH EFFECTIVE SOLUTIONS

November 17, 1998

Leonard Lodder , A.I.A.
Arbuckle Costic Architects, Inc.
363 State Street
Salem, Oregon 97301-3533

RE: STRUCTURAL FEE FOR ADDITIONAL WORK ON COURTHOUSE SQUARE

Dear Leonard:

There are several items which have increased the cost of structural design since we initially started the project last spring. The most notable item is the change in code. On October 1, 1998, the new 1997 Uniform Building Code was adopted by the State. There are major changes in the new code concerning the seismic analysis and design of the structure and foundation system. These changes were unknown until the final edition of the new code was printed. These changes require major revisions in analysis and design. The engineering time required for this greatly exceeds the effort required in the 1994 UBC.

In addition to the Code change, other programmatic design changes have affected our scope of work. Modifications to the design of the additive alternate #2 slab level requires reworking to incorporate new design requirements. The requirements of this floor are to: Support four floors of wood framing for future office or retail space and design the columns and foundation system to support five floors of concrete or steel office/retail space. Per our original contract we were to supply a slab-on-grade pad that could act as a parking area or where future office or retail building could be built. This is much different from designing a floor slab that can support four to five floors of additional office space with parking underneath.

The other item that is a chance to our contract is the addition of a row of columns to the parking area adjacent to the South Marion County Office Building. To accommodate the placement of a new row of columns the bay spacing on the adjacent rows was changed to 28 feet, instead of 30 feet. This changes the slab design. The slab must be redesigned in this area.

The final change to our agreement was the fact that we would be able to use the majority of the steel canopy and steel framing details from the previous design. As you are aware, we are now unable to use the truss design and the canopy design from our previous design due to changes in the configuration.

825 NE Multnomah, Suite 425, Portland, Oregon 97232
(503) 231-6078 phone (503) 231-6482 fax

The fee for the above-mentioned items are as follows:

☐	Seismic code change	$10,520.00
☐	Structural slab at North end	$12,500.00
☐	Redesign of parking slab	$ 8,480.00
☐	Truss & canopy design	$ 4,140.00
	TOTAL	$ 35,640.00

If you prefer, we can bill these items on a TIME & MATERIALS basis. However, the structural slab at the North slab has been completed as have the truss and canopy design in order to stay on schedule.

Please do not hesitate to call me if you should have any questions or concerns, or if you need additional information.

Sincerely yours,

Century West Engineering Corp.

Mike Hayford

Mike Hayford P.E.
Project Manager

EMH:ttt

G:\SHARE\PORTLAND\STRUCTUR\LOR\LOD1198.WPD

Kim Arbuckle, AIA
Alan E. Costic, AIA
Walter E. Bensman, Jr., AIA
Clayton Vorse, AIA
Mark M. Foster, AIA
Leonard Lodder, AIA
Richard S. Rothweiler, AIA

ARBUCKLE COSTIC ARCHITECTS, INC.
363 State Street
Salem, OR 97301-3533
503/581-4114 Fax: 503/581-3655
E-Mail: acarch@open.org

May 5, 1999

Glen Cook, P.E.
Executive Vice President
Century West Engineering
1444 NW College Way
Bend, Oregon 97709

RE: Contract for Structural Engineering Services
Request for Additional Fees
Courthouse Square
Project No. 9828

Dear Glen:

I have recently succeeded in reviewing with the Owner's project manager your request for additional fees to cover perceived changes in scope for the project during the design development and construction document phases of the project. The original letter dated November 17, 1998, from Mike Hayford and the back-up information provided in a letter from Tim Terich, dated February 22, 1999, was reviewed together. Unfortunately, our review is tempered by the significant number of RFIs from the Contractor regarding structural issues. There is considerable concern that the level of completeness of the structural drawings will expose the Owners to significant additional costs through change orders.

The construction team expresses satisfaction with the effort put in by Tim Terich toward resolving current structural issues. However, we are concerned that he may not have had the level of internal support from Century West Engineering during the construction document phase that the project required.

The Owner's project manager prefers to leave final resolution on the additional fee request until the structural RFI issues are generally completed. We trust that while this may not be entirely acceptable to you, it would continue to be in Century West's interest to assist the development team in resolving outstanding structural issues in a timely fashion.

Sincerely,

Leonard Lodder, A.I.A.
Architect

LL:mh

cc: Craig Lewis, Melvin Mark Development Company
Billy Wasson, Marion County
John Whittington, Salem Area Mass Transit
Tim Terich, Century West Engineering

9828.1B

Kim Arbuckle, AIA
Alan E. Costic, AIA
Walter E. Bensman, Jr., AIA
Clayton Vorse, AIA
Mark M. Foster, AIA
Leonard Lodder, AIA
Richard S. Rothweiler, AIA

ARBUCKLE COSTIC ARCHITECTS, INC.
363 State Street
Salem, OR 97301-3533
503/581-4114 Fax: 503/581-3655
E-Mail: acarch@open.org

January 4, 2000

Glen Cook, P.E.
Executive Vice President
Century West Engineering Corporation
549 SW Mill View Way
Bend, Oregon 97702

RE: Contract for Structural Engineering Services
Courthouse Square, Salem, Oregon
Project No. 9828

Dear Glen:

On July 26, 1999, we sent you a letter requesting clarification concerning the arrangements made with Tim Terich to continue to provide structural engineering services for the Courthouse Square project. To date, we have not received any clarification. We understand that since the departure of Tim Terich, Century West Engineering no longer maintains a full time structural engineering department. Without a written assurance that Century West Engineering Corporation has made arrangements to continue retaining Tim Terich as Engineer of Record for the project for the duration of the project and to complete your obligations outlined in the contract for services dated September 3, 1999, we feel compelled to withhold further payment on this account.

We look forward to a timely response to this letter.

Sincerely,

Leonard Lodder, A.I.A.
Architect

LL:gnv

cc: Craig Lewis, Melvin Mark Development Company
Billy Wasson, Marion County
John Whittington, Salem Area Mass Transit
Tim Terich, Century West Engineering

9828.1B

CENTURY WEST
ENGINEERING CORPORATION

LEADING THROUGH EFFECTIVE SOLUTIONS

April 14, 2000

ARBUCKLE COSTIC
APR 19 2000
RECEIVED

Leonard Lodder, AIA
Arbuckle Costic Architects, Inc.
363 State Street
Salem, Oregon 97301-3533

RE: Structural Engineering Services/Court House Square
Project # 9828
CWEC # 41305.001.01

Dear Leonard:

In our letter to you dated November 17, 1998, we outlined additional costs ($35,640) that would be required to complete the design of the subject project. The added design costs related to required 1997 Uniform Building Code design changes and other design changes as requested by the development team. For months we requested a meeting with you and the development team to discuss the changes and the added costs. We were told that the meeting was pending and would be set up as soon as the development teams schedule would allow. Working in good faith, the CWEC structural design team completed the plans on an accelerated schedule and helped secure a building permit for the project.

In our letter to you dated May 20, 1999, we acknowledged receipt of your letter dated May 5, 1999. In your letter you indicated that the Project Manager was unwilling to respond to our request for additional services at that time. You stated that the Development Team was "concerned" with the quality of our work, and the number of RFI's associated with the structural portion of the project. At the time CWEC was not concerned with the number of RFI's to date but choose to continue work on the project to insure that the projects schedule was met. You also stated that the development team was not willing to "discuss" our request for extras until the structural portion of the project was substantially completed. The development team felt that the "poor" quality of our drawings was going to create excessive change orders in the project which would lead to increased costs in construction.

The CWEC structural team, mainly Tim Terich, has been onsite numerous times for construction observations and has responded in a timely manner on the requested structural RFI's. Now that the structural framing is complete, there has been a very low amount of "change orders" related to the structural portion of the project. It is our understanding that the change orders related to the structural portion of the project are on the order of $125,000. For an $18 million dollar building this is less than 1%, which is extremely good for a project of this size.

549 SW Mill View Way, Bend, Oregon 97702
541-388-3500 phone 541-388-5062 fax

9828.1B

Now that the structural portion of the project has been substantially completed, it is quite apparent that the quality of our drawings did not create excessive increases in building construction costs. Please find enclosed an invoice in the amount of $35,640 for additional work as requested in our letter to you dated November 17, 1999. Prompt payment of this invoice would be greatly appreciated.

Sincerely yours,

Glenn E. Cook, P.E.
Vice President

Enclosure

APPENDIX J
CARLSON TESTING SOIL LAB RESULTS

Carlson Testing, Inc.

Main Office
P.O. Box 23814
Tigard, Oregon 97281
Phone (503) 684-3460
FAX (503) 684-0954

Branch Office
4060 Hudson Ave., NE
Salem, OR 97301
Phone (503) 589-1252
FAX (503) 589-1309

May 20, 1999
#99-S1132.CTI

Salem Area Mass Transit District
3140 Del Webb Ave NE
Salem, Oregon 97303-4165

Re: Salem Courthouse Square
555 Court Street NE -- Salem, Oregon
Percent Retained Testing

Gentlemen:

Following are results of a percent retained test conducted on a sample of 2 1/2"-0 onsite material sampled by our representative on May 10, 1999 from the finish belt. This sample was based on a maximum of 46.4% retained on the 3/4" screen, therefore a density curve was not performed.

If there are any further questions regarding this matter, please do not hesitate to contact this office.

Respectfully submitted,

CARLSON TESTING, INC.

Scott M. Jordan
Laboratory Manager

kk

cc: Melvin Marks Development - Craig Lewis
Arbuckle Costic Architects Inc. - Leonard Lodder
Pence Kelly Construction Inc - Steve Schaed
City of Salem Building & Safety Division - Larry Schmidt
Marion County Facilities Management - Bob McCune
Century West Engineering - Timothy T Terich

Carlson Testing, Inc.

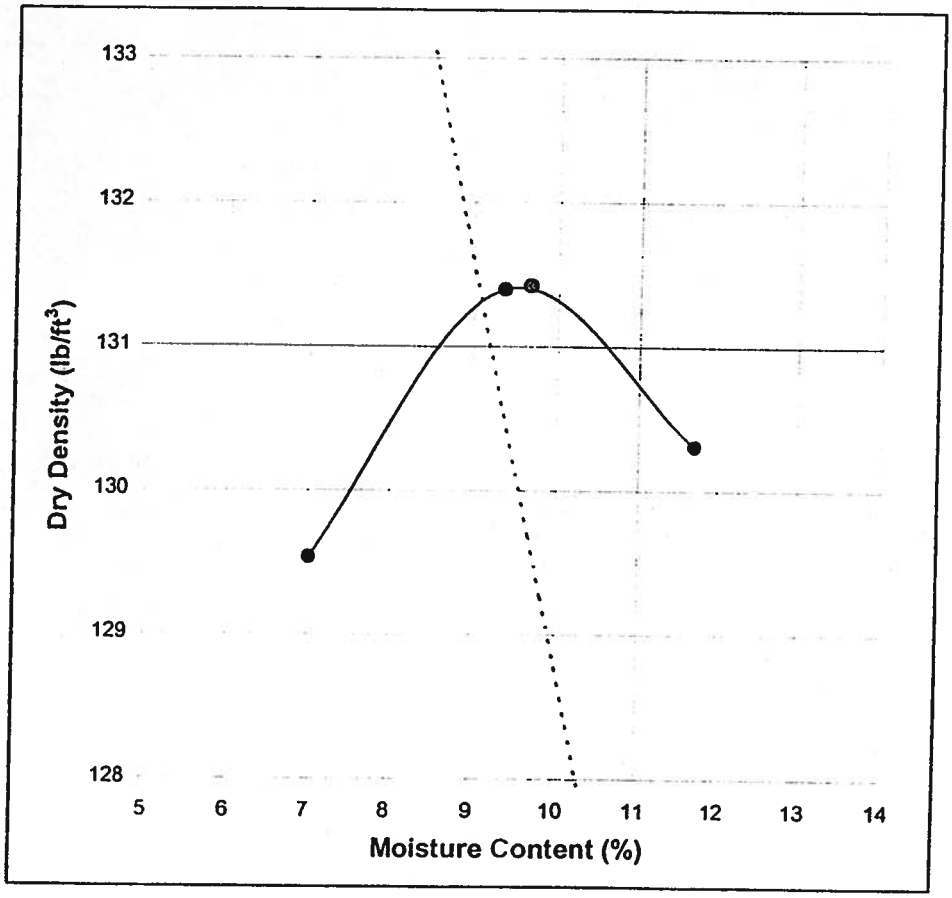
Main Office
PO Box 23814
Tigard, OR 97281
Phone (503)684-3460
Fax # (503)684-0954

Branch Office
4060 Hudson Ave.
Salem, OR 97301
Phone (503)589-1252
Fax # (503)589-1309

Moisture - Density Relationship

Client: Salem Area Mass Transit District — 05/04/99
Project: Salem Couthouse Square — **Job Number:** 99-S1132
Material Type: 2 1/2 - 0" Crushed on Site Rock — **Location:** On-Site

Test Method:	AASHTO T-180 D, T-27, T-265	**Date Sampled:**	04/16/99
Sample Method:	AASHTO T-2	**Date Tested:**	04/16/99
Preparation Method:	Moist	**Oversized Material:**	Removed
Compacting Method:	Manual	**Hammer Type:**	Circular



Zero Air Voids Line = 2.600

Coarse specific gravity used in adjusted max density computations: 2.623

Optimum Moisture: 9.7% — **Max. Dry Density:** 131.4 lbs/ft^3

Percent Passing 3/4" Sieve: 67.0% — **Adjusted Max Density:** 137.5

:c: Salem Courthouse Sq C/O Melvin Marks
Arbuckle Costic Artitects PC
Pense Kelly Construction Inc - Steve Schaed
Pense Kelly Construction Inc - John Gremmels
City of Salem Bldg & Safety Div - Larry Schmidt

Reviewed By:

Carlson Testing, Inc.

Main Office
P.O. Box 23814
Tigard, Oregon 97281
Phone (503) 684-3460
FAX (503) 684-0954

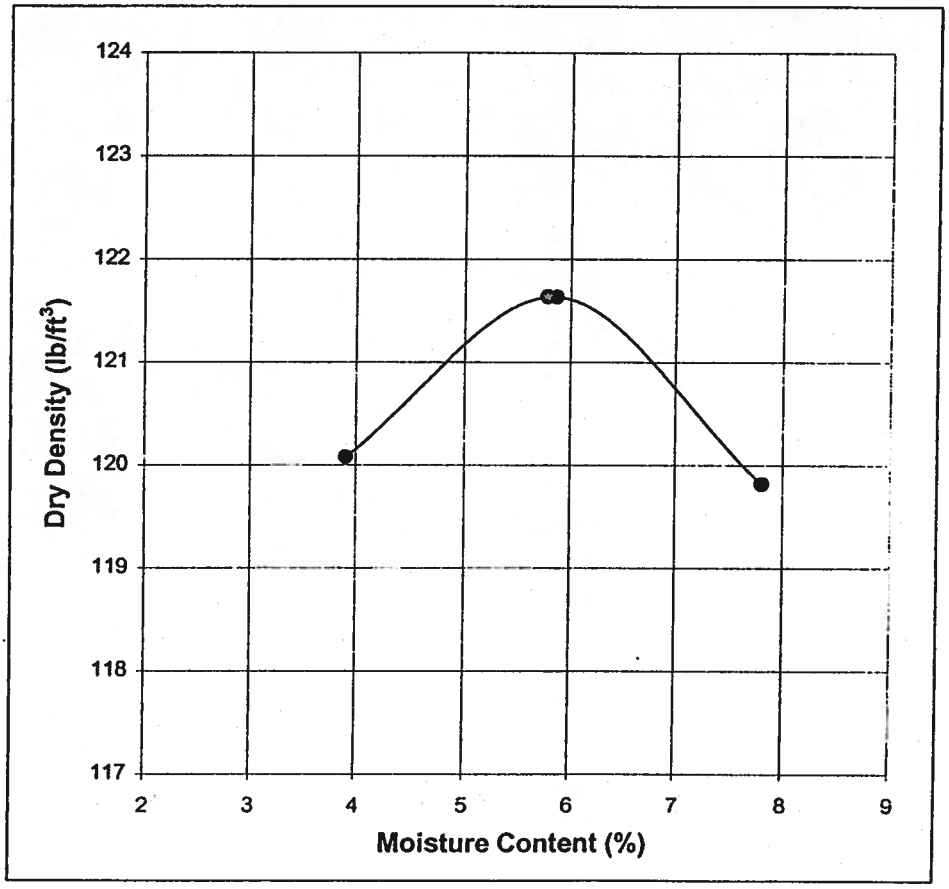
Salem Office
4060 Hudson Ave., NE
Salem, OR 97301
Phone (503) 589-1252
FAX (503) 589-1309

Bend Office
P.O. Box 7918
Bend, OR 97708
Phone (541) 330-9155
FAX (541) 330-9163

Moisture - Density Relationship

Client: Salem Area Mass Transit District — 06/05/00
Project: Salem Courthouse Square — **Job Number:** 99-S1132
Material Type: 3/4"- 0 Rock from River Bend Sand & Gravel — **Location:** On Site Stockpile

Test Method:	ASTM D-1557 C, C-136, D-2216	**Date Sampled:**	06/05/00
Sample Method:	ASTM D-75	**Date Tested:**	06/05/00
Preparation Method:	Moist	**Oversized Material:**	Removed
Compacting Method:	Manual	**Hammer Type:**	Circular



Zero Air Voids Line = 2.500

Optimum Moisture: 5.8% **Max. Dry Density:** 121.6 lbs/ft^3

Percent Passing 3/4" Sieve: 98.9%

cc: Melvin Marks Development - Craig Lewis
Arbuckle Costic Architects Inc. - Leonard Lodder
Pence Kelly Construction Inc. - Steve Schaad
City of Salem - Bob Garrison
Marion County Facilities Management - Bob McCune
Century West Engineering - Timothy T. Terich

Reviewed By: Steven W. Leach, *Branch Manager*

Carlson Testing, Inc.

Main Office
4P.O. Box 23814
Tigard, Oregon 97281
Phone (503) 684-3460
FAX (503) 684-0954

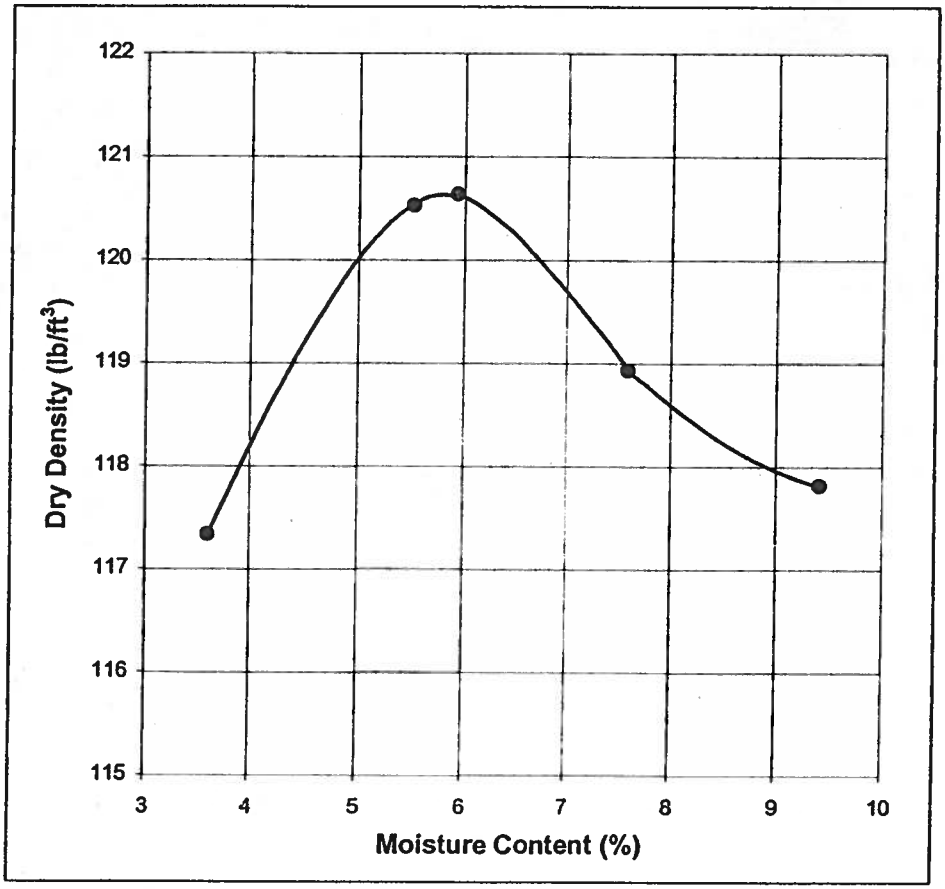
Salem Office
4060 Hudson Ave., NE
Salem, OR 97301
Phone (503) 589-1252
FAX (503) 589-1309

Bend Office
P.O. Box 7918
Bend, OR 97708
Phone (541) 330-9155
FAX (541) 330-9163

Moisture - Density Relationship

Client: Salem Area Mass Transit District — 06/15/00
Project: Salem Courthouse Square — **Job Number:** 99-S1132
Material Type: 1"- 0 Rock — **Location:** On-Site

Test Method:	AASHTO T-99 D, T-27, T-265	**Date Sampled:**	06/09/00
Sample Method:	AASHTO T-2	**Date Tested:**	06/09/00
Preparation Method:	Moist	**Oversized Material:**	Removed
Compacting Method:	Manual	**Hammer Type:**	Circular



Zero Air Voids Line = 2.500

Optimum Moisture: 5.9% **Max. Dry Density:** 120.6 lbs/ft^3

Percent Passing 3/4" Sieve: 92.7%

cc: Melvin Marks Development - Craig Lewis
Arbuckle Costic Architects Inc. - Leonard Lodder
Pence / Kelly Construction Inc. - Steve Schaad
City of Salem Bldg. & Safety Div. - Supervisor
Marion County Facilities Management - Bob McCune
Century West Engineering - Timothy T. Terich

Brian Leach
Project Manager

Reviewed By: _____

APPENDIX K
CARLSON TESTING IN-PLACE DENSITY TEST RESULTS

Carlson Testing Inc

Documentation matrix Compaction Tests

Date of Test	Test #	Max. Dry Density	Optimum Moisture	% Compaction	Field Moisture %	Comments
4/19/1999	sf1	137.5	9.7	100	6.9	
4/27/1999	sf 3	137.5	9.7	95	5.0	
4/28/1999	sf 5	137.5	9.7	95	5.1	
4/28/1999	sf 6	137.5	9.7	95	5.1	
4/28/1999	sf 7	137.5	9.7	95	5.7	
4/30/1999	sf 11	137.5	9.7	97	5.9	
4/30/1999	sf 12	137.5	9.7	99	5.6	
4/30/1999	sf 13	137.5	9.7	95	5.0	
4/30/1999	sf 14	137.5	9.7	95	5.6	
4/30/1999	sf 15	137.5	9.7	97	4.2	
4/30/1999	sf 16	137.5	9.7	95	5.5	
4/30/1999	sf 17	137.5	9.7	95	5.0	
4/30/1999	sf 18	137.5	9.7	96	4.9	
4/29/1999	sf 20	137.5	9.7	96	6.8	
4/29/1999	sf 24	137.5	9.7	95	6.1	
4/29/1999	sf 28	137.5	9.7	95	6.2	
5/3/1999	sf 31	137.5	9.7	95	5.4	
5/3/1999	sf 32	137.5	9.7	95	4.2	
5/3/1999	sf 33	137.5	9.7	98	4.0	
5/3/1999	sf 34	137.5	9.7	96	4.4	
5/3/1999	sf 35	137.5	9.7	96	5.8	
5/3/1999	sf 36	137.5	9.7	95	5.5	
5/3/1999	sf 37	137.5	9.7	98	5.4	
5/3/1999	sf 38	137.5	9.7	95	5.7	
5/4/1999	sf 39	137.5	9.7	95	5.7	
5/4/1999	sf 40	137.5	9.7	95	5.7	
5/4/1999	sf 41	137.5	9.7	99	6.3	
5/4/1999	sf 42	137.5	9.7	95	4.3	
5/4/1999	sf 43	137.5	9.7	96	5.4	
5/4/1999	sf 44	137.5	9.7	96	4.4	
5/4/1999	sf 45	137.5	9.7	95	5.9	
5/4/1999	sf 46	137.5	9.7	96	5.6	
5/5/1999	sf 47	137.5	9.7	95	6.4	
5/5/1999	sf 48	137.5	9.7	97	5.4	
5/5/1999	sf 49	137.5	9.7	100+	6.1	
5/5/1999	sf 50	137.5	9.7	97	6.2	
5/5/1999	sf 51	137.5	9.7	95	5.2	
5/5/1999	sf 52	137.5	9.7	95	5.8	
5/6/1999	sf 53	137.5	9.7	95	5.8	
5/6/1999	sf 54	137.5	9.7	95	5.7	
5/6/1999	sf 55	137.5	9.7	96	5.4	
5/6/1999	sf 56	137.5	9.7	96	5.7	
5/7/1999	sf 57	137.5	9.7	96	5.8	
5/7/1999	sf 58	137.5	9.7	95	6.4	
5/7/1999	sf 59	137.5	9.7	95	6.2	
5/7/1999	sf 60	137.5	9.7	96	5.0	
5/7/1999	sf 61	137.5	9.7	99	5.3	
5/7/1999	sf 63	137.5	9.7	96	4.4	
5/10/1999	sf65	137.5	9.7	95	5.2	
5/10/1999	sf66	137.5	9.7	96	5.5	
5/10/1999	sf67	137.5	9.7	95	5.1	
5/10/1999	sf68	137.5	9.7	96	5.4	
5/10/1999	sf69	137.5	9.7	96	6.5	
5/11/1999	sf70	137.5	9.7	95	5.6	
5/11/1999	sf71	137.5	9.7	95	5.7	
5/11/1999	sf72	137.5	9.7	96	6.1	
5/11/1999	sf73	137.5	9.7	97	6.6	
5/11/1999	sf74	137.5	9.7	95	5.2	
5/11/1999	sf75	137.5	9.7	97	6.2	
5/12/1999	sf76	137.5	9.7	96	5.3	
5/12/1999	sf77	137.5	9.7	95	6.0	
5/12/1999	sf78	137.5	9.7	95	5.9	
5/12/1999	sf79	137.5	9.7	96	5.3	
5/12/1999	sf80	137.5	9.7	95	6.0	
5/14/1999	sf82	137.5	9.7	96	5.6	
5/14/1999	sf84	137.5	9.7	97	4.8	
5/14/1999	sf85	137.5	9.7	94/95	4.8	Report was amended and compaction was changed to 95%.
5/17/1999	sf86	137.5	9.7	95	4.6	
5/17/1999	sf87	137.5	9.7	95	4.4	
5/17/1999	sf88	137.5	9.7	94/95	4.1	Report was amended and compaction was changed to 95%.
5/17/1999	sf89	137.5	9.7	95	4.7	
5/17/1999	sf90	137.5	9.7	98	5.8	
5/18/1999	sf91	137.5	9.7	97	6.1	
5/18/1999	sf92	137.5	9.7	98	4.4	
5/18/1999	sf93	137.5	9.7	95	5.8	
5/19/1999	sf94	137.5	9.7	95	6.1	
5/19/1999	sf96	137.5	9.7	96	5.9	
5/19/1999	sf97	137.5	9.7	96	5.0	
5/19/1999	sf98	137.5	9.7	95	3.6	
5/19/1999	sf99	137.5	9.7	95	3.9	
5/20/1999	sf101	137.5	9.7	96	5.6	
5/20/1999	sf102	137.5	9.7	97	5.5	
5/24/1999	sf103	137.5	9.7	99	4.6	
5/25/1999	sf105	137.5	9.7	95	5.8	
5/25/1999	sf106	137.5	9.7	95	6.4	
5/25/1999	sf107	137.5	9.7	97	5.4	
5/28/1999	sf108	137.5	9.7	100	6.9	
5/28/1999	sf109	137.5	9.7	91	7.0	
5/28/1999	sf111	137.5	9.7	100	7.0	
6/2/1999	sf112	137.5	9.7	96	5.6	
6/2/1999	sf113	137.5	9.7	96	5.1	
6/2/1999	sf114	137.5	9.7	97	5.9	
6/2/1999	sf115	137.5	9.7	100+	6.2	
6/10/1999	sf116	137.5	9.7	97	6.2	
6/10/1999	sf117	137.5	9.7	97	5.7	
6/10/1999	sf118	137.5	9.7	97	5.2	
6/10/1999	sf119	137.5	9.7	96	6.1	
6/10/1999	sf120	137.5	9.7	96	5.8	
6/10/1999	sf121	137.5	9.7	97	6.0	
6/11/1999	sf122	137.5	9.7	98	6.1	
6/11/1999	sf123	137.5	9.7	97	6.2	
6/11/1999	sf124	137.5	9.7	96	6.0	
6/11/1999	sf125	137.5	9.7	96	5.7	
6/11/1999	sf126	137.5	9.7	96	5.2	
6/11/1999	sf127	137.5	9.7	97	5.1	
6/11/1999	sf128	137.5	9.7	96	5.7	
6/11/1999	sf129	137.5	9.7	96	5.3	
6/11/1999	sf130	137.5	9.7	97	6.0	
6/11/1999	sf131	137.5	9.7	96	5.7	

Carlson Testing Inc

Documentation matrix Compaction Tests

Date of Test	Test #	Max. Dry Density	Optimum Moisture	% Compaction	Field Moisture %	Comments
6/11/1999	sf132	137.5	9.7	97	5.3	
6/11/1999	sf133	137.5	9.7	97	5.9	
6/11/1999	sf134	137.5	9.7	96	5.4	
6/11/1999	sf135	137.5	9.7	97	6.3	
6/15/1999	sf136	137.5	9.7	95	3.6	
6/15/1999	sf137	137.5	9.7	95	4.0	
6/15/1999	sf138	137.5	9.7	98	5.7	
6/15/1999	sf139	137.5	9.7	99	4.1	
6/15/1999	sf140	137.5	9.7	98	4.8	
6/15/1999	sf141	137.5	9.7	96	4.0	
6/15/1999	sf142	137.5	9.7	96	4.3	
6/15/1999	sf143	137.5	9.7	95	5.0	
6/15/1999	sf144	137.5	9.7	95	5.3	
6/15/1999	sf145	137.5	9.7	96	4.8	
6/15/1999	sf146	137.5	9.7	95	4.4	
6/15/1999	sf147	137.5	9.7	95	3.5	
6/15/1999	sf148	137.5	9.7	99	4.5	
6/15/1999	sf149	138.2	8.8	95	3.6	
6/21/1999	sf152	137.5	9.7	95	5.3	
6/21/1999	sf153	137.5	9.7	96	5.3	
6/21/1999	sf154	137.5	9.7	96	6.6	
6/21/1999	sf155	137.5	9.7	98	5.3	
6/21/1999	sf156	137.5	9.7	96	6.0	
6/21/1999	sf157	137.5	9.7	97	5.1	
6/21/1999	sf158	137.5	9.7	97	5.7	
6/21/1999	sf159	137.5	9.7	96	5.2	
6/21/1999	sf160	137.5	9.7	95	4.6	
6/21/1999	sf161	137.5	9.7	96	4.6	
6/21/1999	sf162	137.5	9.7	97	5.2	
6/21/1999	sf163	137.5	9.7	97	4.9	
6/21/1999	sf164	137.5	9.7	97	5.6	
6/21/1999	sf165	137.5	9.7	96	5.3	
6/21/1999	sf166	137.5	9.7	98	6.0	
6/21/1999	sf167	137.5	9.7	97	5.7	
6/21/1999	sf168	137.5	9.7	97	6.1	
6/21/1999	sf169	137.5	9.7	96	5.9	
6/22/1999	sf170	137.5	9.7	96	4.9	
6/22/1999	sf171	137.5	9.7	95	5.3	
6/22/1999	sf172	137.5	9.7	96	5.0	
6/22/1999	sf173	137.5	9.7	97	5.6	
6/22/1999	sf174	137.5	9.7	96	4.7	
6/22/1999	sf175	137.5	9.7	96	4.9	
6/22/1999	sf176	137.5	9.7	97	5.1	
6/22/1999	sf179	137.5	9.7	97	6.0	
6/22/1999	sf180	137.5	9.7	96	5.7	
6/22/1999	sf181	137.5	9.7	96	5.8	
6/22/1999	sf183	137.5	9.7	96	6.2	
6/23/1999	sf187	137.5	9.7	99	6.3	
6/23/1999	sf188	137.5	9.7	98	5.9	
6/23/1999	sf189	137.5	9.7	97	6.1	
6/24/1999	sf190	137.5	9.7	97	6.1	
6/24/1999	sf191	137.5	9.7	98	5.7	
6/24/1999	sf192	137.5	9.7	96	6.3	
6/24/1999	sf193	137.5	9.7	96	6.0	
6/24/1999	sf194	137.5	9.7	98	5.9	
6/24/1999	sf195	137.5	9.7	99	6.2	
6/24/1999	sf196	137.5	9.7	96	5.3	
6/25/1999	sf197	137.5	9.7	96	5.6	
6/25/1999	sf198	137.5	9.7	97	6.1	
6/25/1999	sf199	137.5	9.7	98	6.4	
6/25/1999	sf200	137.5	9.7	99	5.4	
6/25/1999	sf201	137.5	9.7	98	4.8	
6/25/1999	sf202	137.5	9.7	96	5.1	
7/7/1999	sf203	137.5	9.7	98	4.6	
7/7/1999	sf204	137.5	9.7	97	4.5	
7/7/1999	sf205	137.5	9.7	97	3.8	
7/7/1999	sf206	137.5	9.7	95	5.2	
7/7/1999	sf206a	137.5	9.7	95	4.2	
7/7/1999	sf207	137.5	9.7	98	5.1	
7/7/1999	sf208	137.5	9.7	98	5.0	
7/7/1999	sf209	137.5	9.7	94	4.8	
7/7/1999	sf209a	137.5	9.7	95	4.8	
7/7/1999	sf210	137.5	9.7	97	4.8	
7/12/1999	sf211	137.5	9.7	96	4.0	
7/13/1999	2 sf	137.5	9.7	97.8	6.0	
7/13/1999	3 sf	137.5	9.7	95	6.6	
7/13/1999	6 sf	137.5	9.7	95.2	6.1	
7/16/1999	1 sf	137.5	9.7	95.1	5.2	
7/16/1999	2 sf	137.5	9.7	99.8	5.4	
7/16/1999	3 sf	137.5	9.7	99.2	6.5	
7/16/1999	4 sf	137.5	9.7	95.3	6.5	
7/20/1999	sf212	137.5	9.7	96	6.3	
7/20/1999	sf213	137.5	9.7	98	5.4	
7/20/1999	sf215	137.5	9.7	96	5.9	
7/20/1999	sf216	137.5	9.7	96	6.6	
7/20/1999	sf217	137.5	9.7	97	4.3	
7/20/1999	sf218	137.5	9.7	96	5.6	
7/20/1999	sf219	137.5	9.7	96	6.1	
7/21/1999	sf220	137.5	9.7	96	6.5	
8/18/1999	sf 1	133.3	8.3	94.5	9.1	90% compaction required.
8/18/1999	sf 3	133.3	8.3	94.1	7.6	90% compaction required.
8/18/1999	sf 4	133.3	8.3	94.7	8.1	90% compaction required.
8/18/1999	sf 59	133.3	8.3	93.9	7.9	90% compaction required.
8/18/1999	sf 6	133.3	8.3	92.9	8.6	90% compaction required.
8/20/1999	sf 1	133.3	8.3	93.2	7.8	90% compaction required.
8/20/1999	sf 2	133.3	8.3	92.3	7.2	90% compaction required.
8/24/1999	1	137.5	9.7	96	6.0	
8/24/1999	2	137.5	9.7	95	5.8	
8/25/1999	sf 3	137.5	9.7	97.1	6.2	
8/25/1999	sf 5	137.5	9.7	95	5.4	
8/25/1999	sf 6	137.5	9.7	95.3	5.5	
8/25/1999	sf 9	137.5	9.7	96.1	6.6	
8/25/1999	sf 10	137.5	9.7	95	6.0	
8/25/1999	sf 15	137.5	9.7	96.9	6.3	
10/15/1999	sf1	138.2	8.8	95	3.9	
10/16/1999	sf 1	138.2	8.8	95	3.8	
10/16/1999	sf 2	138.2	8.8	96	4.7	
10/16/1999	sf 3	138.2	8.8	98	4.7	
10/16/1999	sf 4	138.2	8.8	98	5.6	
10/16/1999	sf 5	138.2	8.8	98	5.2	

Carlson Testing Inc

Documentation matrix Compaction Tests

Date of Test	Test #	Max. Dry Density	Optimum Moisture	% Compaction	Field Moisture %	Comments
10/20/1999	1	138.2	8.8	100	6.3	
10/21/1999	sf 1	138.2	8.8	97	4.6	
10/21/1999	sf 2	138.2	8.8	96	5.6	
10/21/1999	sf 4	138.2	8.8	98	5.1	
10/21/1999	sf 5	138.2	8.8	96	4.9	
10/22/1999	sf 1	138.2	8.8	95	4.8	
10/22/1999	sf 2	138.2	8.8	95	5.1	
10/22/1999	sf 3	138.2	8.8	96	4.8	
10/29/1999	sf 3	138.2	8.8	100+	6.6	
10/30/1999	sf 1	138.2	8.8	96	5.5	
10/30/1999	sf 2	138.2	8.8	96	5.4	
10/30/1999	sf 3	138.2	8.8	99	5.1	
11/4/1999		128.5	9.9			90% compaction required. Inserted to show density value change.
11/19/1999	sf 3	131.1	9.3	98	5.8	
12/4/1999		139.1	9.3			Inserted to show density value change.
1/6/2000	1	138.2	8.8	91	4.9	90% compaction required.
1/6/2000	2	138.2	8.8	90	4.5	90% compaction required.
1/6/2000	3	138.2	8.8	91	4.9	90% compaction required.
1/11/2000	1	139.1	9.3	96	4.9	90% compaction required.
1/11/2000	2	139.1	9.3	93	4.1	90% compaction required.
1/11/2000	3	139.1	9.3	93	4.0	90% compaction required.
1/26/2000	sf 1	139.1	9.3	95	4.8	90% compaction required.
1/26/2000	sf 3	139.1	9.3	97	5.6	90% compaction required.
3/2/2000	sf 1	139.1	9.3	100+	8.5	
3/2/2000	sf 1	139.1	9.3	100+	7.5	
3/2/2000	sf 1	139.1	9.3	100+	5.9	
4/27/2000	et 1	138.2	8.8	91	4.0	No mention of compaction requirements.
4/27/2000	et 2	138.2	8.8	90	4.2	No mention of compaction requirements.
4/27/2000	et 3	138.2	8.8	91	4.7	No mention of compaction requirements.
6/5/2000	sf-1	121.6	5.8	100+	4.5	
6/5/2000	sf-5	121.6	5.8	100+	6.8	
6/9/2000	bc 1	120.6	5.5	100+	3.6	100% compaction requirement.
6/9/2000	bc 2	120.6	5.5	100	3.9	100% compaction requirement.
6/9/2000	bc 3	120.6	5.5	100+	4.4	100% compaction requirement.
6/9/2000	bc 4	120.6	5.5	100	5.2	100% compaction requirement.
6/9/2000	bc 5	120.6	5.5	100	5.8	100% compaction requirement.
6/16/2000	sf 1	127.1	10.8	100+	5.3	100% compaction requirement.
6/16/2000	sf 2	127.1	10.8	100	7.2	100% compaction requirement.
6/16/2000	sf 3	127.1	10.8	100+	3.6	100% compaction requirement.
6/21/2000	sf 1	134.7	9.7	100+	4.0	100% compaction requirement.
6/21/2000	sf 2	134.7	9.7	100+	6.0	100% compaction requirement.
6/21/2000	sf 3	134.7	9.7	100+	7.2	100% compaction requirement.
6/27/2000	1	138.2	8.8	100+	6.5	
6/27/2000	2	138.2	8.8	100+	6.2	
6/27/2000	3	138.2	8.8	100	5.9	
6/27/2000	4	138.2	8.8	100+	6.9	
6/27/2000	5	138.2	8.8	100+	7.0	
6/30/2000	1	120.6	5.9	100+	7.3	100% compaction requirement.
6/30/2000	2	120.6	5.9	100+	7.0	100% compaction requirement.
6/30/2000	3	120.6	5.9	100+	7.4	100% compaction requirement.
6/30/2000	4	120.6	5.9	100+	7.1	100% compaction requirement.
7/6/2000	bc 1	138.2	8.8	100+	4.5	100% compaction requirement.
7/6/2000	bc 2	138.2	8.8	100+	6.6	100% compaction requirement.
7/6/2000	bc 3	138.2	8.8	100+	4.5	100% compaction requirement.
7/6/2000	bc 4	138.2	8.8	100+	6.3	100% compaction requirement.
7/10/2000	sf 1	120.6	5.9	100+	7.4	100% compaction requirement.
7/10/2000	sf 2	120.6	5.9	100+	6.1	100% compaction requirement.
7/10/2000	sf 3	120.6	5.9	100+	7.5	100% compaction requirement.
7/10/2000	sf 4	120.6	5.9	100+	5.5	100% compaction requirement.
7/12/2000	sf 1	120.6	5.9	100+	4.2	100% compaction requirement.
7/12/2000	sf 2	120.6	5.9	100+	5.7	100% compaction requirement.
7/12/2000	sf 3	120.6	5.9	100+	7.4	100% compaction requirement.
7/12/2000	sf 4	120.6	5.9	100+	5.3	100% compaction requirement.
7/12/2000	sf 5	120.6	5.9	100+	6.2	100% compaction requirement.
7/17/2000	bc	120.6	5.9	100+	5.1	100% compaction requirement.
7/17/2000	bc	120.6	5.9	100+	4.4	100% compaction requirement.
7/17/2000	bc	120.6	5.9	100+	4.3	100% compaction requirement.
7/17/2000	bc	120.6	5.9	100+	4.7	100% compaction requirement.
7/17/2000	bc	120.6	5.9	100+	5.2	100% compaction requirement.
7/17/2000	bc	120.6	5.9	100+	5.8	100% compaction requirement.
7/17/2000	bc	120.6	5.9	100+	5.3	100% compaction requirement.
7/17/2000	bc	120.6	5.9	100+	5.3	100% compaction requirement.
7/19/2000	1	138.2	8.8	100+	6.3	100% compaction requirement.
7/19/2000	2	138.2	8.8	100+	6.9	100% compaction requirement.
7/19/2000	3	138.2	8.8	100+	7.0	100% compaction requirement.
8/2/2000	1	120.6	9.9	100+	6.0	100% compaction requirement.
8/2/2000	2	120.6	9.9	100+	5.7	100% compaction requirement.
8/2/2000	3	120.6	9.9	100+	6.4	100% compaction requirement.
8/3/2000	1	120.6	5.9	100+	4.8	100% compaction requirement.
8/11/2000	1	120.6	5.9	100	7.7	100% compaction requirement.
8/11/2000	2	120.6	5.9	100+	7.9	100% compaction requirement.
8/11/2000	3	120.6	5.9	100	6.7	100% compaction requirement.
8/11/2000	4	120.6	5.9	100	7.6	100% compaction requirement.
8/18/2000	sf 1	120.6	5.9	100+	4.8	100% compaction requirement.
8/18/2000	sf 2	120.6	5.9	100+	5.8	100% compaction requirement.
8/18/2000	sf 3	120.6	5.9	100	5.4	100% compaction requirement.
8/18/2000	sf 4	120.6	5.9	100	5.4	100% compaction requirement.
8/18/2000	sf 5	120.6	5.9	100	4.1	100% compaction requirement.
8/18/2000	sf 6	120.6	5.9	100+	11.2	100% compaction requirement.
8/18/2000	sf 7	120.6	5.9	100+	9.3	100% compaction requirement.
8/25/2000	1	138.2	8.8	100+	6.5	
8/25/2000	2	138.2	8.8	100+	7.1	
8/25/2000	3	138.2	8.8	100+	6.9	
8/25/2000	4	138.2	8.8	100+	6.9	
8/30/2000		137.5	9.7	95	5.0	
8/30/2000		137.5	9.7	96.5	4.0	
8/30/2000		137.5	9.7	96.3	5.2	
8/30/2000		137.5	9.7	99.4	6.4	
8/30/2000		137.5	9.7	96.5	6.0	
9/6/2000	1	120.6	5.9	100	7.9	100% compaction requirement.
9/6/2000	2	120.6	5.9	100+	8.4	100% compaction requirement.
9/6/2000	3	120.6	5.9	100+	8.3	100% compaction requirement.
9/6/2000	4	120.6	5.9	100	8.0	100% compaction requirement.
9/6/2000	5	120.6	5.9	100+	8.1	100% compaction requirement.
9/6/2000	6	120.6	5.9	100+	7.0	100% compaction requirement.
9/6/2000	7	120.6	5.9	100+	7.0	100% compaction requirement.
9/6/2000	8	120.6	5.9	100	6.9	100% compaction requirement.

APPENDIX L
CARLSON TESTING CONCRETE COMPRESSIVE STRENGTH TEST RESULTS

P- Pozzolith
S- Stealthmesh
WRA- Water Reducing Agent
PY- Polyheed

AEA- MB AE 90 ?
T- Tetragard

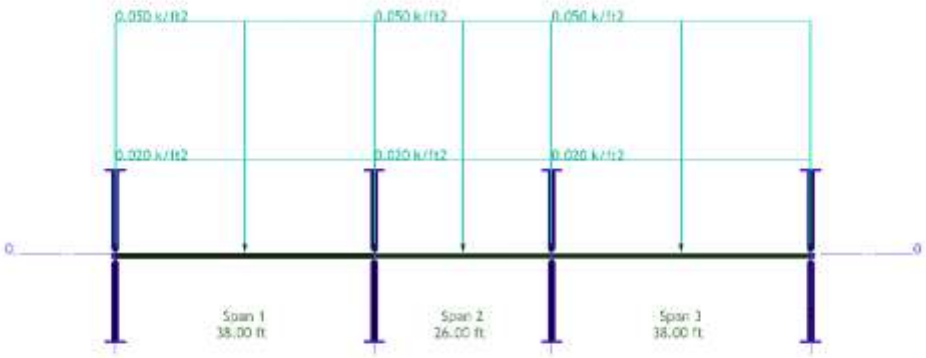
Date	3 day	4 day	5 day	6 day	7 day	14 day	28 day	28 day	28 day	28 day	28 day	56 day	Location	Strength Requirement In 1,000's	Slump Inches	Admix amount oz	Brand	Admix amount oz.	Brand	Mix No.
2/3/1999					3520		4430	4700					Slab on Grade	3	5	300	p	Hot H2O	S	5.5-4fm
4/23/1999					4120		5550	5390					Continuous footing	3	3					5.5-4pk
4/28/1999					5300		5630	5550					Spread footing	5						5k-4
4/30/1999					4220		5520	5330					Continuous footing	3	4					5.5-4 5.5sk
4/30/1999					5370		6110	6040	5970				Continuous footing	3	4					5.5 sacks
4/30/1999					4940		6000	5860					Spread footing	5	4	216	wra	369	py	5k-4 6.5 sk
5/4/1999					3050		3880	4020	4220	4140	4330		Preconstruction Prisms	2	3.5	203	aea	24	wra	6.58ba 6.5 sk
5/4/1999					3180		4120	4120	4320	4280	4470		Preconstruction Prisms	2	3.5					6.58ba 6.5 sk
5/5/1999					4570		6020	6020					Footing	5	4.5					5k-4
5/5/1999					4930		5870	5850					Footing	5	4.5					5k-4
5/12/1999					3220		3660	4340					Footing	3	4.5	18	wra			5.5-4 5.5sk
5/12/1999					5930		6180	6290					Spread footing	5	4	24	wra	41	py	5k4 6.4 sk
5/17/1999					5240		5490	5530					Crane footing	3	4.5					5.5-4pk 5sk
5/17/1999					5320		5750	5800					Air shaft 1st lift	5	5					5k-4 6.2
5/20/1999					5370		6280	6270					East shear wall footing 1st lift	5	5	240	wra	410	py	5k-4
5/20/1999					5930		6650	6630					East shear wall footing 2nd lift	5	4.5	240	wra	410	py	5k-4/6.2
5/20/1999					6510		6950	6910					East shear wall footing 3rd lift	5	4	210	wra	410	py	5k-4/6.2
5/20/1999					5950		6300	6400					East Shear wall footing 4th lift	5	4	240	wra	410	py	5k-4/6.2
5/20/1999					5830		6400	6440					East Shear wall footing 4th lift	5	4	240	wra	410	py	5k-4/6.2
5/20/1999					5300		5880	6000					East shear wall footing 5th lift	5	4	240	wra	410	py	5k-4/6.2sk
5/20/1999					5370		6010	5950					East shear wall footing final lift	5	4	240	wra	410	py	5k-4/6.2sk
5/20/1999					6310		6900	6890					East shear wall footing final lift	5	4	240	wra	410	py	5k-4/6.2sk
5/20/1999					4960		5500	5640					Walls grid 2nd lift	5	5	240	wra	410	py	5k-4/6.2sk
5/25/1999					4870		5640	5650					Footing	5	4					5k-4/7.2sk
5/25/1999					4360		4940	4980					Footing	3	3.5					5.5-4/5.5sk
5/26/1999					3760		5590	5530	5730				Wall line grids 1st lift	5	4	240	wra	410	py	5k-4
5/26/1999					3580		4830	4960					Footing	3	5	180	wra			5.5-4/5.5sk
5/28/1999					4500		5280	5440					Spread footing	5	5					5k-4/6.5sk
6/2/1999					5330		5940	6130					Wall	5	5	215	wra	369	py	5k-4/6.8sk
6/3/1999					5360		6250	6270					Stair well shear footing	5	5					5k-4
6/3/1999					5300		5950	5990					Stair well shear footing	5	5	216	wr	369	py	5k-4
6/4/1999					4750		5740	5740					Wall	5	4.5	240	wra	410	py	5k-4/6.8
6/8/1999					4480		5420	5340					Shear wall footing	5	5	240	wra	410	py	5k-4
6/8/1999					4560		5540	5590					Shear wall footing	5	5	240	wra	410	py	5k-4
6/8/1999					4560		5470	5450					Shear wall footing	5	5	240	wra	410	py	5k-4
6/8/1999					4360		5310	5320					Shear wall footing	5	5	240	wra	410	py	5k-4
6/8/1999					4580		5490	5520					Shear wall footing	5	5	240	wra	410	py	5k-4
6/8/1999					4500		5410	5380					18" from top @ sw corner	5	5	240	wra	410	py	5k-4/6.5sk
6/8/1999					4490		5380	5490					East of center down 6"	5	5	240	wra	410	py	5k-4/6.5sk
6/8/1999					4560		5380	5380					Shear wall footing	5	5	240	wra	410	py	5k-4
6/8/1999					4750		5340	5370					Columns	5	7.5					5k-8
6/8/1999					4510		5520	5610					Columns	5	7	28	wra	99	py	5k-8
6/9/1999					3760		4590	4560					Footing	3	4.5	155	wra			5.5k/4pk
6/9/1999					4290		5260	5200					Wall	5	5	21	wra	41	py	5k-4
6/10/1999					5240		5990	6060					Sum pit floor slab	5	5	24	wra	41	py	sk-4/6.5sk
6/11/1999					4510		5110	5240					Footing	3	5	279	wra			5.5k-4pk 5.5sk
6/11/1999					4940		5700	5760					Spread footing	5	7	24	wra	41	py	5k-8
6/11/1999					4950		5870	5990					Columns	5	7	98	wra	347	py	5k-8
6/15/1999					4700		5420	5430					Spread footing	5	5	24	wra	41	py	5k-8/7.5sk
6/15/1999					4740		5560	5660					Columns	5	6	19	mbl/200n	99	py	5k-8/7.5sk
6/16/1999					3320		4270	4220					Slab on Grade	3	4.5	18	p	1.5# per cu yd	s	5.5-4/5.5sk
6/16/1999					4560		5240	5330					Wall	5	5	24	mbl/200n	41	py	5k-4/6.5sk
6/16/1999					5530		6320	6250					Columns	5	7	19	mbl/200n	99	py	5k-8/7sk
6/16/1999					4260		5010	5020					Sump pit walls	5	5	24	mbl/200n	41	py	5k-4/6.5sk
6/21/1999					3300								Slab on Grade	3	5	18	mbl/200n	1.5	s	5.5k-4/5.5sk
6/22/1999					4900		5860	5950					Columns	5	5	28	mbl/200n	99	py	5k-8
6/22/1999					4540		5380	5380					Spread footing	5	5	24	mbl/200n	41	py	5k-4
6/23/1999					3620		5000	5020	5240				Wall	5	4	24	mbl/200n	41	py	5k-4 6.5 sk
6/24/1999					5700		6170	6330	6300				Columns	5	7	19	mbl/200n	99	py	5k-8/7.5sk
6/25/1999					4370		5610	5660	5620				Shear wall 1st lift	5	7	21	mbl zoon	99	py	5k-8/7.5sk
6/28/1999					4550		5280	5200	5270				Columns	5	5	21	mbl/200n	41	py	5k-4 6.5 sk
6/29/1999					3620								Continuous footing	3	4	310	mbl/200n			5.5-4k/5.5sk
6/29/1999					4380								Spread footing	5	5	24	mbl/200n	41	py	5k-4/6.5sk
6/30/1999					4610								Footing	5	5	24	mbl/200n	41	py	5k-4/6sk
7/1/1999					4350								Slab on grade	3	5	18	mbl/200n	1.5	s	5.5-4 fm
7/1/1999					3230								Slab on grade	3	5	18	mbl/200n	1.5	s	5.5-4 fm
7/1/1999					4320								Columns	5	6	19	mbl/200n	99	py	5k-8/7.5sk
7/1/1999					4310								Footing	5	5	24	mbl/200n	41	py	5k-4/6.5sk
7/2/1999					4690								Shear wall	5	6	19	mbl/200n	99	py	5k-8
7/7/1999					4990								Wall	5	5	21 oz per cu yd	mbl/200n	41	py	5sk-4
7/8/1999					3350								Slab on Grade	3	5	30 oz per cu yd	MB 200n	1.5 lb/cu yd	s	5.5-4fm/5.5sk
7/8/1999					3650								Ramp walls	5	5	24	MB 200n	43	py	5k-3/7.5sk
7/8/1999					3360								Footing	3	5	18 oz/cu yd	MB 200n			5.5-4fm/5.5sk
7/8/1999					3710								Spread footing	5	5	24	MB 200n	41	py	5k-4/6.5sk
7/13/1999					3580								Wall	5	5	24	MB 200n	43	py	5k3/6.5sk
7/13/1999					3880								Wall	5	5	24	MB 200n	41	py	5k-4/6.2sk
7/15/1999					3780								Spread footing	5	4.5	24	MB 200n	41	py	5k-4/6.2sk
7/19/1999					3950		4690	4620	5390				Slab on Grade	3	5	18 oz/cu yd	MB 200n	1.5 lb/cu yd	s	5.5-4fm/5.5sk
7/19/1999	2470				3260		4890	4940				5270	Footing	5	5	24 oz/cu yd	MB 200n	41 oz/ cu yd	py	5k-4/6.2sk
7/21/1999			4140										Post tension pour	3 @ 5days / 5 @ 28days	5	64 oz/yd	t	39oz/yd	py	5k-4fmt
			4110																	
			4030																	
7/21/1999			4210										Post tension pour	3 @ 5days / 5 @ 28days	5.5	64 oz/yd	t	1.5 lb/cu yd	s	5k-4fmt
			4250																	
7/21/1999			3910										Post tension pour	3 @ 5days / 5 @ 28days	5.5	64 oz/yd	t	1.5 lb/cu yd	s	5k-4fmt
			3960																	
7/21/1999			3900										Post tension pour	3 @ 5days / 5 @ 28days	5.5	64 oz/yd	t	1.5 lb/cu yd	s	5k-4fmt
			3950																	
7/27/1999					4420		5340	5350					Spread footing	5	5	24	mb zoon	41	py	5k-4/6.2
7/28/1999					4670		5460	5520					Columns	5	5.5	24 oz/cu yd	MB 200n	41 oz/ cu yd	py	5k-4/6.2
7/28/1999					3440		4120	4130					Continuous footing	3	3	310	wr			5.5-4pk
7/28/1999					4220		5030	5130					Spread footing	5	5	24	mb zoon	41	py	5k-4/6.2
7/29/1999		4030					5330	5320 ?					PT Pour	3 @ 4days / 5 @ 28days	5.5	24 oz/cu yd	MB 200n	1.5 lb/cu yd	s	5k-4fmt/6.2sk
		4050																		
		4160																		
		4140																		
7/29/1999		4090					5190	5220					PT pour	3 @ 4days / 5 @ 28days	5	24 oz/cu yd	MB 200n	41	py	5k-4fmt/6.2sk
		4150					5390	5370							5.5	1.5 lb/cu yd	s	41 oz/ cu yd	py	5k-4fmt/6.2sk
7/29/1999					4510		5480	5480					Columns	5	6	29oz/yd	mb 200n	91 oz/yd	py	5k-8
8/2/1999					4900		6050	6090					Columns	5	5	21oz/yd	mb 200n	91 oz/yd	py	5k-8/6.2sk
8/3/1999					4230		5880	5920					Spread footing	5	5	24	mb zoon	41	py	5k-4/6.2sk
8/3/1999					4940		6020	6090	6230				Shear wall	5	5	18	mb zoon	91	py	5k-8
8/4/1999					4880		5960	5940					Columns	5	5	18oz/yd	mb 200n	91 oz/yd	py	5k-4
8/5/1999					3780		5070	5270				5660	Spread footing	5	4.5	24oz/yd	mb zoon	41oz/yd	py	5k-4/6.2
8/5/1999					4290		5260	5240					Spread footing	5	5	24oz/yd	mb zoon	41oz/yd	py	5k-4/6.2
8/6/1999	3660						6000	6020					PT Pour	3 @ 3days / 5 @ 28days	5	68oz/yd	mb 200n	1.5 lb/cu yd	s	5k-3fmt
	3640																			
8/6/1999	3670				4320		5670	5690					PT Pour	3 @ 3days / 5 @ 28days	5					5k-3fmt
8/6/1999	3320				4210		5720	5730					PT Pour	3 @ 3days / 5 @ 28days	5					5k-3fmt
8/10/1999					4900		5690	5750					Columns	5	5	24oz/yd	mb 200n	41oz/yd	py	5k-8
8/11/1999					3870		4600	4640					Continuous footing	3	5	18oz/yd	mb 200n			5k-4/5.5sk
8/12/1999					5040		6030	6090					Shear wall	5	7	28oz/yd	mb 200n	99oz/yd	py	5k-8/7.5sk
8/13/1999					4350		5040	5120					Exterior vertical wall	5	5					5k-4
8/24/1999					4430		5540	5530					Arcade beams	5	5	24	mb zoon	41	py	5k-4
8/24/1999	3620	3960			4970		5670	5730					PT Pour	3 @ 4days / 5 @ 28days	5	24oz/yd	mb 200n	41oz/yd	py	5k-4/6.2sk
8/24/1999	3550	4040			4610		5250	5270					PT Pour	3 @ 4days / 5 @ 28days	5	24oz/yd	mb 200n	41oz/yd	py	5k-4
8/24/1999	3870	3960			4510		5140	5200					PT Pour	3 @ 4days / 5 @ 28days	5	24oz/yd	mb 200n	41oz/yd	py	5k-4/6.2sk
8/24/1999	3350	3510			4210		5100	5200					PT Pour	3 @ 4days / 5 @ 28days	5	24oz/yd	mb 200n	41oz/yd	py	5k-4/6.2sk
8/25/1999					4180		5430	5410					Wall	5	4.5					5k-4
8/26/1999					4020		5530	5590					Columns	5	6	29oz/yd	mb 200n	99oz/yd	py	5k-8/7.5sk
8/27/1999					4340		5600	5590					Shear wall	5	6	21oz/yd	mb 200n	91 oz/yd	py	5k-8/7.2sk
8/31/1999					4680								Footing	5	5	24oz/yd	mb 200n	41oz/yd	py	5k-4/6.2sk
9/1/1999					4570								Footing/column	5	4.5					5k-8
9/3/1999					4710								Columns	5	6.5	182	mb zoon	644	py	5k-8/6.2
9/7/1999					4830								Columns	5	6.5					5k-8
9/8/1999					4820								Columns	5	5	24oz/yd	mb 200n	91 oz/yd	py	5k-8/7.2sk
9/10/1999	4240	4450			4700								PT Pour	3 @ 4days / 5 @ 28days	5	24oz/yd	mb 200n	41oz/yd	py	5k-4/6.2sk
9/10/1999	3750	3990			4340								Slab on deck	3 @ 4days / 5 @ 28days	5	24oz/yd	mb 200n	41oz/yd	py	5k-4/6.2sk
9/10/1999		3760			3970								Slab on deck	3 @ 4days / 5 @ 28days	5	24oz/yd	mb 200n	41oz/yd	py	5k-4/6.2sk
9/10/1999		4240			4470								Floor pour	3 @ 4days / 5 @ 28days	4.5	24oz/yd	mb 200n	41oz/yd	py	5k-4/6.2sk
9/10/1999		3650			4260								Slab on deck	3 @ 4days / 5 @ 28days	5	24oz/yd	mb 200n	41oz/yd	py	5k-4/6.2sk
9/10/1999	3750	3900			4150								Slab on deck	3 @ 4days / 5 @ 28days	5	24oz/yd	mb 200n	41oz/yd	py	5k-4/6.2sk
9/13/1999					3930								Air shaft	5	7	24oz/yd	mbl zoon	41oz/yd	py	5k-4/6.2sk
9/14/1999					4550								Columns	5	6	21oz/yd	mb 200n	91 oz/yd	py	5k-8/7.2sk
9/16/1999					4510		5890	5830					Shear wall	5	6.5	21oz/yd	mb 200n	91 oz/yd	py	5k-8/7.2sk
9/17/1999		4300					5910	5940					Knock-out wall	5	5	24oz/yd	mb 200n	41oz/yd	py	5k-4/6.2sk
9/22/1999	3530						5340	5390					PT Pour	5	5	24oz/yd	mb 200n	41oz/yd	py	5k-4
	3270																			
9/22/1999	3470						5370	5300					PT Pour	3 @ 3days / 5 @ 28days	6	40oz/yd	mb 200n	45oz/yd	py	5k-4
9/22/1999	3760						5610	5520					PT Pour	3 @ 3days / 5 @ 28days	6	40oz/yd	mb 200n	45oz/yd	py	5k-4
9/22/1999	3190						5420	5410					PT Pour	3 @ 3days / 5 @ 28days	6	40oz/yd	mb 200n	45oz/yd	py	5k-4

9/22/1999	3270				5350	5340		PT Pour	3 @ 3days / 5 @ 28days	6	40oz/yd	mb 200n	45oz/yd	py	5k-4
	3360														
9/22/1999	3620			3900	5010	4950		PT Pour	3 @ 3days / 5 @ 28days	6	40oz/yd	mb 200n	45oz/yd	py	5k-4
9/28/1999				4700	6080	6140		Columns	5	Flowable					5k-8
10/4/1999	3350			4380	5670	5700		PT Pour	3 @ 3days / 5 @ 28days	5	45oz/yd	mb 200n	40oz/yd	py	5k-4
10/4/1999	4020			4500	5700	5760		PT Pour	3 @ 3days / 5 @ 28days	5	45oz/yd	mb 200n	40oz/yd	py	5k-4
10/4/1999	3900			4180	5410	5450		PT Pour	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
10/4/1999	3500			4100	5290	5400		PT Pour	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
10/4/1999	3470			4060	5480	5400		PT Pour	3 @ 3days / 5 @ 28days		40oz/yd	mb 200n	45oz/yd	py	5k-4
10/8/1999				4710	5870	5940		Shear wall	5	6	24oz/yd	mb 200n	94oz/yd	py	5k-8
10/13/1999				2930	3850	3910		Slab on grade	3	5	30	p 200n	1.5 lb/cu yd	s	5.5-4fm
10/13/1999				2990	3990	3900		Slab on grade	3	5					5.5-4fm
10/14/1999	3800			4920	5560	5650		Floor pour	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
10/14/1999	3780			4670	6070	6120		Floor pour	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
10/14/1999	3770			4670	6050	6150		Floor pour	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
10/14/1999	3420			4650	5620	5670		Floor pour	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
10/14/1999	3420			4650	5660	5710		Floor pour	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
10/14/1999		3040						Floor pour field cure cylinders	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
		3110													
10/18/1999				4090	4510	4460		Slab on grade	3	5	18oz/yd	mb 200n	1.5 lb/cu yd	s	5.5-4fm
10/18/1999				4140	4560	4460		Slab on grade	3	5	30oz/yd	mb 200n	1.5 lb/cu yd	s	5.5-4fm
10/19/1999				4260	5280	5400		Elevator shaft walls	5	5.5					5k-8
10/20/1999				3140	4150	4200		Slab on grade	3	5	30oz/yd	mb 200n	1.5 lb/cu yd	s	5.5-4fm
10/20/1999				3190	4280	4250		Slab on grade	3		30oz/yd	mb 200n	1.5 lb/cu yd	s	5.5-4fm
10/25/1999				4940	5940	6000		Wall	5	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
10/26/1999	4540				5920	5810		Floor pour	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
10/26/1999	4550				6060	5830		Floor pour	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
10/26/1999	4380				6080	6180		Floor pour	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
10/26/1999	4460				6180	6190		Floor pour	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
10/26/1999	4530			4500	6060	6150		Floor pour	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
10/26/1999	4360							Field cures	3 @ 3days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
	4160														
	4130														
11/1/1999				3210	4370	4250		Slab on grade	3	5	19oz/yd	mb 200n	1.5 lb/cu yd	s	5.5-4fm
11/1/1999				3180	4060	4170		Slab on grade	3		19oz/yd	mb 200n	1.5 lb/cu yd	s	5-5fm
11/1/1999				5170	6480	6510		Shear wall	5	6	24oz/yd	mb 200n	91oz/yd	py	5k-8
11/2/1999				3250	4240	4250		Slab on grade	3	5	24oz/yd	mb 200n	1.5 lb/cu yd	s	5.5-4fm
11/2/1999				3810	4380	4420		Slab on grade	3	5	24oz/yd	mb 200n	1.5 lb/cu yd	s	5.5-4fm
11/5/1999	3790	4600	4100		5880	5940		5th Floor	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
11/5/1999		4000			5740	5670		5th floor PT	3 @ 4days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
11/5/1999		4330			5630	5670		5th floor PT	3 @ 4days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
11/5/1999		4310			5700	5850		5th floor PT	3 @ 4days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
11/5/1999		3830		4660	5790	5860		5th floor PT	3 @ 4days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
11/11/1999				4730	6850	6730		Shear wall	5	5	24oz/yd	mb 200n	90oz/yd	py	5k-8
11/17/1999	4100				5450	5590		5th floor PT	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4/6.5sk
11/17/1999	3480				5630	5560		5th floor PT	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4/6.5sk
	3550														
11/17/1999				4100	5480	5510		5th floor PT	3 @ 3days / 5 @ 28days	5					5k-4/6.5sk
11/17/1999	3760				5560	5620		5th floor PT	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4/6.5sk
11/17/1999	4160			4450	5600	5670		5th floor PT	3 @ 3days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4
	3980														
11/22/1999				5350	7060	7060		Shear wall/5th floor/columns	5	6	19oz/yd	mb 200n	90oz/yd	py	5k-8
11/23/1999				3270	4170	4280		Slab on grade	3	5	300	zoon			5.5-4fm
12/3/1999		3380			5430	5310		Roof pour	3 @ 4days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k4-t
12/3/1999		3300			5000	5120		Roof pour	3 @ 4days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4t
12/3/1999		3040			5290	5030		Roof pour	3 @ 4days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4t
12/3/1999		3430			5020	5070		Roof pour	3 @ 4days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4t
12/3/1999			3420		5250	5410		Roof pour	3 @ 4days / 5 @ 28days	5	40oz/yd	mb 200n	45oz/yd	py	5k-4t
12/8/1999				5290	6040	6170		Shear walls	5	6					5k-8
12/10/1999				3390	4110	4190		Slab on grade	3	5	300oz/ld	wra		hot water	5.5-4fc/5.5sk
12/10/1999				3320	4130	3890		Slab on grade	3	5.5	300oz/ld	wra	520oz/ld	Pozz 20	5.5-4fc/5.5sk
12/20/1999	3360				5100	5100		Roof pour	3 @ 3days / 5 @ 28days	5	390oz/ld	mb 200n	640oz/ld	t	5k-4t
12/20/1999	3180				5550	5590		Roof pour	3 @ 3days / 5 @ 28days	5	390oz/ld	mb 200n	640oz/ld	t	5k-4t
12/20/1999	3020				5370	5170		Roof pour	3 @ 3days / 5 @ 28days	5	390oz/ld	mb 200n	640oz/ld	t	5k-4t
12/20/1999	3170				5590	5270		Roof pour	3 @ 3days / 5 @ 28days	5	390oz/ld	mb 200n	640oz/ld	t	5k-4t
12/20/1999	3280				5450	5460		Roof pour	3 @ 3days / 5 @ 28days	5	390oz/ld	mb 200n	640oz/ld	t	5k-4t
12/23/1999				4550	6300	6370		Mechanical curb walls	5	4					5k-4
12/27/1999				5260	6470	6530		Roof slab closure strip	5	Flowable					5k-4t
12/28/1999				5600	7140	7160		PT Deck	5	2.75		pozz 20			5k-4tfm
12/28/1999				5580	6960	6970		PT Deck	5	4		pozz 20			5k-4tfm
12/28/1999			3700					PT Deck	3	4		pozz 20			5k-4tfm
			3760												
			3760												
			3800												
12/30/1999				5550	6560	6610	6720	Mechanical curbs on roof	4 or 5	5.5					5k-4
1/6/2000		3340	3820		5880	5860		Bus mall slab	3 @ 4days / 5 @ 28days	5	680oz/ld	mb 200n	640oz/ld	t	5k-4fmt
1/6/2000		3780	3990		5950	6020		Bus mall slab	3 @ 4days / 5 @ 28days	5	680oz/ld	mb 200n	640oz/ld	t	5k-4fmt
1/17/2000	2320				5280	5190		Pre-cast panel P-2	5	4.5	477oz/ld	wr	448	t	5k-4tfm
	2955														
1/17/2000	3250	3580			5590	5560		Bus mall slab	3 @ 3days / 5 @ 28days	5	640oz/ld	pozz 200n	680oz/ld	t	5k-4tfm
1/17/2000		4030			5940	5880		Bus mall slab	3 @ 3days / 5 @ 28days	5	640oz/ld	pozz 200n	680oz/ld	t	5k-4tfm
		4040													
1/29/2000		3670			6090	6010		Bus mall slab	3 @ 4days / 5 @ 28days	5	640oz/ld	pozz	680oz/ld	t	5k-4tfm
1/29/2000		3890			6280	6340		Bus mall slab	3 @ 4days / 5 @ 28days	4	640oz/ld	pozz	680oz/ld	t	5k-4tfm
1/29/2000		3210		5280	6220	6250		Bus mall slab	3 @ 4days / 5 @ 28days	4	640oz/ld	pozz	680oz/ld	t	5k-4tfm
1/29/2000		3210		5240	6260	6370		Bus mall slab	3 @ 4days / 5 @ 28days	4	640oz/ld	pozz	680oz/ld	t	5k-4tfm
2/10/2000			3820		6979	6585		Bus mall slab	3 @ 4days / 5 @ 28days	4	600	mb zoon	650	t	5k-4tm
2/10/2000			4060	3400 5410	7093	7001		Bus mall slab	3 @ 4days / 5 @ 28days	4.5	600	mb zoon	650	t	5k-4tm
			3170												
2/10/2000			3500	3250 5210	7190	7158		Bus mall slab	3 @ 4days / 5 @ 28days	3.5	600	mb zoon	650	t	5k-4tm
			3500												
2/28/2000				4200	6500	6360	6860	PT pour bus mall slab	3 @ 4days / 5 @ 28days	5	680oz/ld	mb zoon	640oz/ld	t	5k-4tfm
											1%	pozz82	1.5 lb/cu yd	s	
2/28/2000		3300		4840	6260	6240		Bus mall slab	3 @ 4days / 5 @ 28days	5	680oz/ld	mb 200n	640oz/ld	t	5k-4tfm
2/28/2000		3720			6770	6950		Bus mall slab	3 @ 4days / 5 @ 28days	5	680oz/ld	mb 200n	640oz/ld	t	5k-4tfm
		3720													
2/28/2000		3620			6680	6560		Bus mall slab	3 @ 4days / 5 @ 28days	5	680oz/ld	mb 200n	640oz/ld	t	5k-4tfm
		3700													
3/3/2000				3630	4860	4840		Slab on grade	3	5	65oz/ld	mb 200n		hot H2O	5k-14fm
3/10/2000	3650	4160			6630	6690		Bus mall slab	3500 @ 4days / 5 @ 28days	5	69oz/ld	mb 200n	68oz/ld	t	5k-4tfm
3/10/2000		4300			6250	6180		Bus mall slab	3500 @ 4days / 5 @ 28days	5	69oz/ld	mb 200n	64oz/ld	t	5k-4tfm/6.3sk
		4250													
3/10/2000		4520			6600	6630		Bus mall slab	3500 @ 4days / 5 @ 28days	5	68oz/ld	mb 200n	64oz/ld	t	5k-4tfm/6.3sk
3/10/2000	3760	4170						Bus mall slab field cure	3500 @ 4days / 5 @ 28days	5	68oz/ld	mb 200n	64oz/ld	t	5k-4tfm/6.3sk
		4130													
3/17/2000				5460	6730	6700	6900	Arcade wall	5	5	28	200n	99oz/yd	py	5k-8
3/24/2000	3890 *			*	*			Last bus mall pour	3 @ 4days / 5 @ 28days	5					5k-4tfm
3/24/2000		4160			5731	5790	6340	Last bus mall pour	3 @ 4days / 5 @ 28days	5					5k-4tfm
3/24/2000		3760			5903	5882	6800	Last bus mall pour	3 @ 4days / 5 @ 28days	5					5k-4tfm
3/24/2000		3760			6233	6028	6800	Last bus mall pour	3 @ 4days / 5 @ 28days	5					5k-4tfm
3/24/2000	3730 *							Last bus mall pour	3 @ 4days / 5 @ 28days	5					5k-4tfm
4/4/2000			6060	4860	5350	8600	8150	Post tension ducts	5		16	interplast n	16	sikament 86	
				6850											
4/10/2000	4720		5850		6210		7080	Clock tower slab on deck	5	5	60	zoon	64	pozz 82	5k-4
4/14/2000	4740				7140	6980	7940	NE stair well walls/Elevated beam	3 @ 3days / 5 @ 28days	4					5k-4
								Column foundation footing							
5/18/2000			5640		6310	6510	6430	NW stair tower/steps and landing	5	3.5	200	zoon	225	py	5k-4
5/20/2000			5370		6280	6270		Shear wall footing	5	5	240	wra	410	py	5k-4
5/20/2000			5930		6650	6630		Shear wall footing	5	4.5	240	wra	410	py	5k-4/6.2sk
5/20/2000			6510		6950	6910		Shear wall footing	5	4	210	wra	410	py	5k-4/6.2sk
5/20/2000			5950		6300	6400		Shear wall footing	5	4	240	wra	410	py	5k-4/6.2sk
5/20/2000			5830		6400	6440		Shear wall footing	5	4	240	wra	410	py	5k-4/6.2sk
5/20/2000			5300		5880	6000		Shear wall footing	5	4	240	wra	410	py	5k-4/6.2sk
5/20/2000			6310		6900	6890		Shear wall footing	5	4	240	wra	410	py	5k-4/6.2sk
5/20/2000			4960		5500	5640		Walls	5	5	240	wra	410	py	5k-4/6.2sk
6/10/2000			5240	*	*			Sump pit floor slab	5	5	24	wra	41	py	sk-4/6.5sk

APPENDIX M
ADAPT SOFTWARE ANALYSIS

Appendix M

Courthouse Square
Lvl5. Band. Grid K w/ full live load



Thursday, March 03, 2011

1 - USER SPECIFIED GENERAL ANALYSIS AND DESIGN PARAMETERS

Parameter	Value	Parameter	Value
Concrete		Minimum Cover at BOTTOM	1.00 in
F'c for BEAMS/SLABS	5000.00 psi	Post-tensioning	
For COLUMNS/WALLS	5000.00 psi	SYSTEM	UNBONDED
Ec for BEAMS/SLABS	4030.50 ksi	Fpu	270.00 ksi
For COLUMNS/WALLS	4030.50 ksi	Fse	175.00 ksi
CREEP factor	2.00	Strand area	0.153 in 2
CONCRETE WEIGHT	NORMAL	Min CGS from TOP	1.00 in
UNIT WEIGHT	150.00 pcf	Min CGS from BOT for interior spans	1.00 in
Tension stress limits / (f'c)1/2		Min CGS from BOT for exterior spans	1.75 in
At Top	6.000	Min average precompression	125.00 psi
At Bottom	6.000	Max spacing / slab depth	8.00
Compression stress limits / f'c		Analysis and design options	
At all locations	0.450	Structural system - Equiv Frame	TWO-WAY
Reinforcement		Moments reduced to face of support	YES
Fy (Main bars)	60.00 ksi	Moment Redistribution	YES
Fy (Shear reinforcement)	60.00 ksi	DESIGN CODE SELECTED	ACI-318 (1999)
Minimum Cover at TOP	1.00 in		

2 - INPUT GEOMETRY

2.1 Principal Span Data of Uniform Spans

Span	Form	Length	Width	Depth	TF Width	TF Thick.	BF/MF Width	BF/MF Thick.	Rh	Right Mult.	Left Mult.
		ft	in	in	in	in	in	in	in		
1	1	38.00	12.00	10.00					0.00	14.00	14.00
2	1	26.00	12.00	10.00					0.00	14.00	14.00
3	1	38.00	12.00	10.00					0.00	14.00	14.00

2.7 Support Width and Column Data

Joint	Support Width	Length LC	B(DIA.) LC	D LC	% LC	CBC LC	Length UC	B(DIA.) UC	D UC	% UC	CBC UC
	in	ft	in	in			ft	in	in		
1	12.0	12.5	12.0	12.0	100	(2)	12.5	12.0	12.0	100	(2)
2	12.0	12.5	12.0	12.0	100	(2)	12.5	12.0	12.0	100	(2)
3	12.0	12.5	12.0	12.0	100	(2)	12.5	12.0	12.0	100	(2)
4	12.0	12.5	12.0	12.0	100	(2)	12.5	12.0	12.0	100	(2)

3 - INPUT APPLIED LOADING

3.1 Loading As Appears in User's Input Screen

Span	Class	Type	W	P1	P2	A	B	C	F	M
			k/ft2	k/ft	k/ft	ft	ft	ft	k	k-ft
1	LL	U	0.050							
1	SDL	U	0.020							
2	LL	U	0.050							
2	SDL	U	0.020							
3	LL	U	0.050							
3	SDL	U	0.020							

NOTE: SELFWEIGHT INCLUSION REQUIRED (SW= SELF WEIGHT Computed from geometry input and treated as dead loading. Unit selfweight W = 150.0 pcf

NOTE: LIVE LOADING is SKIPPED with a skip factor of 1.00

3.2 Compiled loads

Span	Class	Type	P1	P2	F	M	A	B	C	Reduction Factor
			k/ft	k/ft	k	k-ft	ft	ft	ft	%
1	LL	U	1.400							0.000
1	SDL	U	0.560							
1	SW	U	3.500							
2	LL	U	1.400							0.000
2	SDL	U	0.560							
2	SW	U	3.500							
3	LL	U	1.400							0.000
3	SDL	U	0.560							
3	SW	U	3.500							

4 - CALCULATED SECTION PROPERTIES

4.1 Section Properties of Uniform Spans and Cantilevers

Span	Area	I	Yb	Yt
	in2	in4	in	in
1	3360.00	0.28E+05	5.00	5.00
2	3360.00	0.28E+05	5.00	5.00
3	3360.00	0.28E+05	5.00	5.00

5 - MOMENTS, SHEARS AND REACTIONS

5.1 Span Moments and Shears (Excluding Live Load)

Span	Load Case	Moment Left	Moment Midspan	Moment Right	Shear Left	Shear Right
		k-ft	k-ft	k-ft	k	k
1	SW	0.01	425.56	-412.38	-55.65	77.35
2	SW	-412.39	-116.64	-412.39	-45.50	45.50
3	SW	-412.38	425.56	0.01	-77.35	55.65
1	SDL	0.00	68.09	-65.98	-8.90	12.38
2	SDL	-65.98	-18.66	-65.98	-7.28	7.28
3	SDL	-65.98	68.09	0.00	-12.38	8.90
1	XL	0.00	0.00	0.00	0.00	0.00
2	XL	0.00	0.00	0.00	0.00	0.00
3	XL	0.00	0.00	0.00	0.00	0.00

5.2 Reactions and Column Moments (Excluding Live Load)

Joint	Load Case	Reaction	Moment Lower Column	Moment Upper Column
		k	k-ft	k-ft
1	SW	55.65	0.00	0.00
2	SW	122.85	0.00	0.00
3	SW	122.85	0.00	0.00
4	SW	55.65	0.00	0.00
1	SDL	8.90	0.00	0.00
2	SDL	19.66	0.00	0.00
3	SDL	19.66	0.00	0.00
4	SDL	8.90	0.00	0.00
1	XL	0.00	0.00	0.00
2	XL	0.00	0.00	0.00
3	XL	0.00	0.00	0.00
4	XL	0.00	0.00	0.00

5.3 Span Moments and Shears (Live Load)

Span	Moment Left Max	Moment Left Min	Moment Midspan Max	Moment Midspan Min	Moment Right Max	Moment Right Min	Shear Left	Shear Right
	k-ft	k-ft	k-ft	k-ft	k-ft	k-ft	k	k
1	0.00	0.01	190.24	-20.01	-196.92	-8.05	-23.31	31.78
2	-196.93	-8.05	78.28	-124.94	-196.93	-8.05	-25.46	25.46
3	-196.93	-8.05	190.24	-20.01	0.00	0.01	-31.78	23.31

5.4 Reactions and Column Moments (Live Load)

Joint	Reaction Max	Reaction Min	Moment Lower Column Max	Moment Lower Column Min	Moment Upper Column Max	Moment Upper Column Min
	k	k	k-ft	k-ft	k-ft	k-ft
1	23.31	-1.05	0.00	0.00	0.00	0.00
2	57.25	11.15	0.00	0.00	0.00	0.00
3	57.25	11.15	0.00	0.00	0.00	0.00
4	23.31	-1.05	0.00	0.00	0.00	0.00

6 - MOMENTS REDUCED TO FACE OF SUPPORT

6.1 Reduced Moments at Face of Support (Excluding Live Load)

Span	Load Case	Moment Left	Moment Midspan	Moment Right
		k-ft	k-ft	k-ft
1	SW	27.40	425.58	-374.17
2	SW	-390.08	-116.67	-390.08
3	SW	-374.17	425.58	27.40
1	SDL	4.38	68.09	-59.87
2	SDL	-62.42	-18.67	-62.42
3	SDL	-59.87	68.09	4.38
1	XL	0.00	0.00	0.00
2	XL	0.00	0.00	0.00
3	XL	0.00	0.00	0.00

6.2 Reduced Moments at Face of Support (Live Load)

Span	Moment Left Max	Moment Left Min	Moment Midspan Max	Moment Midspan Min	Moment Right Max	Moment Right Min
	k-ft	k-ft	k-ft	k-ft	k-ft	k-ft
1	-0.53	11.48	190.25	-20.01	-181.25	-7.94
2	-184.33	-2.75	78.28	-124.92	-184.33	-2.76
3	-181.25	-7.94	190.25	-20.01	-0.53	11.48

7 - SELECTED POST-TENSIONING FORCES AND TENDON PROFILES

7.1 Tendon Profile

Tendon A

Span	Type	X1/L	X2/L	X3/L	A/L
1	1	0.100	0.500	0.100	---
2	1	0.100	0.500	0.100	---
3	1	0.100	0.500	0.100	---

7.2 Selected Post-Tensioning Forces and Tendon Drape

Tendon A

Span	Force	CGS Left	CGS C1	CGS C2	CGS Right	P/A	Wbal	WBal (%DL)
	k	in	in	in	in	psi	k/-	

1	1126.000	-5.00	---	-8.25	-1.00	335.12	2.729	67
2	1126.000	-1.00	---	-3.00	-1.00	335.12	2.221	55
3	1126.000	-1.00	---	-8.25	-5.00	335.12	2.729	67

All Tendons

Span	Force	Total P/A	Total WBal (%DL)
	k	psi	
1	1126	335.12	67
2	1126	335.12	55
3	1126	335.12	67

Approximate weight of strand: 2230.4 LB

7.4 Required Minimum Post-Tensioning Forces

	Based on Stress Conditions			Based on Minimum P/A		
Type	Left	Center	Right	Left	Center	Right
	k	k	k	k	k	k
1	0.00	1076.68	1075.28	420.00	420.00	420.00
2	1131.48	279.90	1131.48	420.00	420.00	420.00
3	1075.28	1076.68	0.00	420.00	420.00	420.00

7.5 Service Stresses (tension shown positive)

Envelope of Service 1

Span	Left Top Max-T	Left Top Max-C	Left Bot Max-T	Left Bot Max-C	Center Top Max-T	Center Top Max-C	Cetner Bot Max-T	Cetner Bot Max-C	Right Top Max-T	Right Top Max-C	Right Bot Max-T	Right Bot Max-C
	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi
1	-----	-422.91	-----	-273.06	-----	-1046.80	376.56	-73.98	382.08	-----	-----	-1052.32
2	428.81	-----	-----	-1099.05	21.00	-414.47	-----	-691.24	428.81	-----	-----	-1099.05
3	382.08	-----	-----	-1052.32	-----	-1046.80	376.56	-73.98	-----	-422.91	-----	-273.06

7.6 Post-Tensioning Balance Moments, Shears and Reactions

Span Moments and Shears

Span	Moment Left	Moment Center	Moment Right	Shear Left	Shear Right
	k-ft	k-ft	k-ft	k	k
1	-2.30	-351.75	280.58	2.46	2.46
2	280.33	94.08	280.33	0.00	0.00
3	280.58	-351.75	-2.30	-2.46	-2.46

Reactions and Column Moments

Joint	Reaction	Moment Lower Column	Moment Upper Column
	k	k-ft	k-ft
1	-2.463	0.000	0.000
2	2.463	0.000	0.000
3	2.463	0.000	0.000
4	-2.463	0.000	0.000

Note: Moments are reported at face of support

8 - FACTORED MOMENTS AND REACTIONS ENVELOPE

8.1 Factored Design Moments (Not Redistributed)

Span	Left Max	Left Min	Middle Max	Middle Min	Right Max	Right Min
	k-ft	k-ft	k-ft	k-ft	k-ft	k-ft
1	42.37	62.79	967.77	610.33	-1008.10	-713.48
2	-1040.45	-731.76	-149.97	-495.41	-1040.45	-731.77

3	-1008.10	-713.48	967.77	610.33	42.37	62.79

8.2 Reactions and Column Moments

Joint	Reaction Max	Reaction Min	Moment Lower Column Max	Moment Lower Column Min	Moment Upper Column Max	Moment Upper Column Min
	k	k	k-ft	k-ft	k-ft	k-ft
1	127.54	86.12	0.00	0.00	0.00	0.00
2	299.37	221.00	0.00	0.00	0.00	0.00
3	299.37	221.00	0.00	0.00	0.00	0.00
4	127.54	86.12	0.00	0.00	0.00	0.00

8.3 Secondary Moments

Span	Left	Midspan	Right
	k-ft	k-ft	k-ft
1	-1.23	-46.80	-92.33
2	-93.58	-93.58	-93.58
3	-92.33	-46.80	-1.23

8.4 Factored Design Moments (Redistributed)

Span	Left Max	Left Min	Middle Max	Middle Min	Right Max	Right Min	Redist. Coef. Left	Redist. Coef Right
	k-ft	k-ft	k-ft	k-ft	k-ft	k-ft		
1	65.06	44.76	1040.00	691.24	-870.62	-597.06	0.00	17.38
2	-868.65	-595.42	-318.03	-7.71	-868.65	-595.42	17.34	19.44
3	-870.62	-597.07	1040.00	691.24	65.06	44.76	14.69	0.00

Note: Moments are reported at face of support

10 - MILD STEEL - NO REDISTRIBUTION

10.1 Required Rebar

10.1.1 Total Strip Required Rebar

Span	Location	From	To	As Required	Ultimate	Minimum
		ft	ft	in2	in2	in2
1	TOP	37.50	37.99	2.85	2.85	0.00
2	TOP	0.00	0.50	2.25	2.25	0.00
2	TOP	25.50	26.00	2.25	2.25	0.00
3	TOP	0.00	0.50	2.85	2.85	0.00
1	BOT	7.60	20.90	6.00	6.00	5.26
3	BOT	17.10	30.40	6.00	6.00	5.26

10.2 Provided Rebar

10.2.1 Total Strip Provided Rebar

Span	ID	Location	From	Quantity	Size	Length	Area
			ft			ft	in2
1	1	TOP	35.09	10	5	5.50	3.10
2	2	TOP	23.70	10	5	5.50	3.10
1	3	BOT	4.70	7	6	19.50	3.08
3	4	BOT	14.20	7	6	19.50	3.08
1	5	BOT	6.60	7	6	15.50	3.08
3	6	BOT	16.10	7	6	15.50	3.08

10.2.2 Total Strip Steel Disposition

Span	ID	Location	From	Quantity	Size	Length
			ft			ft

1	1	TOP	35.09	10	5	2.91
2	1	TOP	0.00	10	5	2.59
2	2	TOP	23.70	10	5	2.30
3	2	TOP	0.00	10	5	3.20
1	3	BOT	4.70	7	6	19.50
1	5	BOT	6.60	7	6	15.50
3	4	BOT	14.20	7	6	19.50
3	6	BOT	16.10	7	6	15.50

11 - MILD STEEL - REDISTRIBUTED

11.1 Required Rebar

11.1.1 Total Strip Required Rebar

Span	Location	From	To	As Required	Ultimate	Minimum
		ft	ft	in2	in2	in2
1	BOT	7.60	24.70	7.91	7.91	5.26
3	BOT	13.30	30.40	7.91	7.91	5.26

11.2 Provided Rebar

11.2.1 Total Strip Provided Rebar

Span	ID	Location	From	Quantity	Size	Length	Area
			ft			ft	in2
1	1	BOT	4.70	9	6	23.00	3.96
3	2	BOT	10.40	9	6	23.00	3.96
1	3	BOT	6.60	9	6	17.50	3.96
3	4	BOT	14.20	9	6	17.50	3.96

11.2.2 Total Strip Steel Disposition

Span	ID	Location	From	Quantity	Size	Length
			ft			ft
1	1	BOT	4.70	9	6	23.00
1	3	BOT	6.60	9	6	17.50
3	2	BOT	10.40	9	6	23.00
3	4	BOT	14.20	9	6	17.50

10.3 - Base Reinforcement

10.3.1 Isolated bars

Span	Location	From	Quantity	Size	Cover	Length	Area
--	--	ft	--	--	in	ft	in2
1	TOP	.00	8	6	.75	6.08	3.52
1	TOP	31.92	8	6	.75	12.32	3.52
2	TOP	19.76	8	6	.75	12.32	3.52
3	TOP	31.92	8	6	.75	6.08	3.52

10.3.2 Mesh Reinforcement

#	Span	Location	From	Spacing	Size	Cover	Length	Area
--	--	--	ft	in	--	in	ft	in2
1	1	BOT	.00	24.00	4	.75	38.00	2.80
	2	BOT	.00	24.00	4	.75	26.00	2.80
	3	BOT	.00	24.00	4	.75	38.00	2.80

13 - PUNCHING SHEAR REINFORCEMENT

13.1 Critical Section Geometry

Column	Layer	Cond.	a	d	b1	b2
			in	in	in	in
1	1	2	4.19	8.37	16.19	20.37
2	1	1	4.19	8.37	20.37	20.37
3	1	1	4.19	8.37	20.37	20.37
4	1	2	4.19	8.37	16.19	20.37

13.2 Critical Section Stresses

Label	Layer	Cond.	Factored shear	Factored moment	Stress due to shear	Stress due to moment	Total stress	Allowable stress	Stress ratio
			k	k-ft	ksi	ksi	ksi	ksi	
1	1	2	-127.54	-0.03	0.29	0.086	0.375	0.240	1.558
2	1	1	-299.28	+0.02	0.44	0.000	0.439	0.296	1.482
3	1	1	-299.28	+0.00	0.44	0.000	0.438	0.296	1.482
4	1	2	-127.54	+0.03	0.29	0.086	0.375	0.240	1.558

13.3 Punching Shear Reinforcement

Reinforcement option: Stirrups

Bar Size: 4

Col.	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs
	in		in		in		in		in	
1	***	***								
2	***	***								
3	***	***								
4	***	***								

Dist. = Distance measured from the face of support

Note: Columns with --- have not been checked for punching shear.

Note: Columns with *** have exceeded the maximum allowable shear stress.

14 - DEFLECTIONS

14.1 Maximum Span Deflections

Span	SW	SW+PT	SW+PT+ SDL	SW+PT+SDL +Creep	LL	X	Total
	in	in	in	in	in	in	in
1	1.18	0.21	0.35	1.05(436)	0.37(1228)	0.00(*****)	1.41(323)
2	-0.22	-0.04	-0.08	-0.23(1343)	-0.09(3620)	0.00(*****)	-0.32(979)
3	1.18	0.21	0.35	1.05(436)	0.37(1228)	0.00(*****)	1.41(323)

16 - Unbalanced Moment Reinforcement

16.1 Unbalanced Moment Reinforcement - No Redistribution

Joint	Gamma Left	Gamma Right	Width Left	Width Right	Moment Left Neg	Moment Left Pos	Moment Right Neg	Moment Right Pos	As Top	As Bot	n Bar Top	n Bar Bot
			ft	ft	k-ft	k-ft	k-ft	k-ft	in2	in2		
1	0.00	0.60	0.00	3.50	0.00	0.00	0.00	62.79	0.00	0.00	0	0
2	0.60	0.60	3.50	3.50	0.00	0.00	-32.31	0.00	0.00	0.00	0	0
3	0.60	0.60	3.50	3.50	-32.31	0.00	0.00	0.00	0.00	0.00	0	0
4	0.60	0.00	3.50	0.00	0.00	62.79	0.00	0.00	0.00	0.00	0	0

16.2 Unbalanced Moment Reinforcement - Redistributed

Joint	Gamma Left	Gamma Right	Width Left	Width Right	Moment Left Neg	Moment Left Pos	Moment Right Neg	Moment Right Pos	As Top	As Bot	n Bar Top	n Bar Bot
			ft	ft	k-ft	k-ft	k-ft	k-ft	in2	in2		
1	0.00	0.60	0.00	3.50	0.00	0.00	0.00	63.41	0.00	0.00	0	0

2	0.60	0.60	3.50	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0	0
3	0.60	0.60	3.50	3.50	0.00	0.00	-0.00	-0.00	0.00	0.00	0	0
4	0.60	0.00	3.50	0.00	0.00	63.41	0.00	0.00	0.00	0.00	0	0

Courthouse Square
Lvl5. Dist. Grid 11 w/ full live load

Thursday, March 03, 2011

1 - USER SPECIFIED GENERAL ANALYSIS AND DESIGN PARAMETERS

Parameter	Value	Parameter	Value
Concrete		Minimum Cover at BOTTOM	1.00 in
F'c for BEAMS/SLABS	5000.00 psi	Post-tensioning	
For COLUMNS/WALLS	5000.00 psi	SYSTEM	UNBONDED
Ec for BEAMS/SLABS	4030.50 ksi	Fpu	270.00 ksi
For COLUMNS/WALLS	4030.50 ksi	Fse	175.00 ksi
CREEP factor	2.00	Strand area	0.153 in 2
CONCRETE WEIGHT	NORMAL	Min CGS from TOP	1.00 in
UNIT WEIGHT	150.00 pcf	Min CGS from BOT for interior spans	1.00 in
Tension stress limits / (f'c)1/2		Min CGS from BOT for exterior spans	1.75 in
At Top	6.000	Min average precompression	125.00 psi
At Bottom	6.000	Max spacing / slab depth	8.00
Compression stress limits / f'c		Analysis and design options	
At all locations	0.450	Structural system - Equiv Frame	TWO-WAY
Reinforcement		Moments reduced to face of support	YES
Fy (Main bars)	60.00 ksi	Moment Redistribution	YES
Fy (Shear reinforcement)	60.00 ksi	DESIGN CODE SELECTED	ACI-318 (1999)
Minimum Cover at TOP	1.00 in		

2 - INPUT GEOMETRY

2.1 Principal Span Data of Uniform Spans

Span	Form	Length	Width	Depth	TF Width	TF Thick.	BF/MF Width	BF/MF Thick.	Rh	Right Mult.	Left Mult.
		ft	in	in	in	in	in	in	in		
C	1	12.00	12.00	10.00					0.00	19.00	13.00
1	1	28.00	12.00	10.00					0.00	19.00	13.00
2	1	28.00	12.00	10.00					0.00	19.00	13.00
3	1	28.00	12.00	10.00					0.00	19.00	13.00
4	1	28.00	12.00	10.00					0.00	19.00	13.00
5	1	19.00	12.00	10.00					0.00	19.00	13.00

2.7 Support Width and Column Data

Joint	Support Width	Length LC	B(DIA.) LC	D LC	% LC	CBC LC	Length UC	B(DIA.) UC	D UC	% UC	CBC UC
	in	ft	in	in			ft	in	in		
1	12.0	12.5	12.0	12.0	100	(2)	12.5	12.0	12.0	100	(2)
2	12.0	12.5	12.0	12.0	100	(2)	12.5	12.0	12.0	100	(2)
3	12.0	12.5	12.0	12.0	100	(2)	12.5	12.0	12.0	100	(2)
4	12.0	12.5	12.0	12.0	100	(2)	12.5	12.0	12.0	100	(2)
5	12.0	12.5	12.0	12.0	100	(2)	12.5	12.0	12.0	100	(2)
6	12.0	12.5	12.0	12.0	100	(2)	12.5	12.0	12.0	100	(2)

3 - INPUT APPLIED LOADING

3.1 Loading As Appears in User's Input Screen

Span	Class	Type	W	P1	P2	A	B	C	F	M
			k/ft2	k/ft	k/ft	ft	ft	ft	k	k-ft
CANT	LL	U	0.050							
CANT	LL	C				0.000			3.200	
CANT	SDL	U	0.020							
CANT	SDL	C				0.000			9.280	
1	LL	U	0.050							

1	SDL	U	0.020							
2	LL	U	0.050							
2	SDL	U	0.020							
3	LL	U	0.050							
3	SDL	U	0.020							
4	LL	U	0.050							
4	SDL	U	0.020							
5	LL	U	0.050							
5	SDL	U	0.020							

NOTE: SELFWEIGHT INCLUSION REQUIRED (SW= SELF WEIGHT Computed from geometry input and treated as dead loading. Unit selfweight W = 150.0 pcf
NOTE: LIVE LOADING is SKIPPED with a skip factor of 1.00

3.2 Compiled loads

Span	Class	Type	P1	P2	F	M	A	B	C	Reduction Factor
			k/ft	k/ft	k	k-ft	ft	ft	ft	%
CL	LL	U	1.600							0.000
CL	LL	C			3.200		0.000			0.000
CL	SDL	U	0.640							
CL	SDL	C			9.280		0.000			
CL	SW	U	4.000							
1	LL	U	1.600							0.000
1	SDL	U	0.640							
1	SW	U	4.000							
2	LL	U	1.600							0.000
2	SDL	U	0.640							
2	SW	U	4.000							
3	LL	U	1.600							0.000
3	SDL	U	0.640							
3	SW	U	4.000							
4	LL	U	1.600							0.000
4	SDL	U	0.640							
4	SW	U	4.000							
5	LL	U	1.600							0.000
5	SDL	U	0.640							
5	SW	U	4.000							

4 - CALCULATED SECTION PROPERTIES

4.1 Section Properties of Uniform Spans and Cantilevers

Span	Area	I	Yb	Yt
	in2	in4	in	in
CANT	3840.00	0.32E+05	5.00	5.00
1	3840.00	0.32E+05	5.00	5.00
2	3840.00	0.32E+05	5.00	5.00
3	3840.00	0.32E+05	5.00	5.00
4	3840.00	0.32E+05	5.00	5.00
5	3840.00	0.32E+05	5.00	5.00

5 - MOMENTS, SHEARS AND REACTIONS

5.1 Span Moments and Shears (Excluding Live Load)

Span	Load Case	Moment Left	Moment Midspan	Moment Right	Shear Left	Shear Right

		k-ft	k-ft	k-ft	k	k
CANT	SW	-----	-----	-288.00	-----	48.00
1	SW	-288.00	120.38	-255.24	-57.17	54.83
2	SW	-255.25	133.85	-261.05	-55.79	56.21
3	SW	-261.05	126.14	-270.67	-55.66	56.34
4	SW	-270.67	143.42	-226.49	-57.58	54.42
5	SW	-226.49	67.25	0.00	-49.92	26.08
CANT	SDL	-----	-----	-46.08	-----	16.96
1	SDL	-46.08	19.26	-40.84	-9.15	8.77
2	SDL	-40.84	21.42	-41.77	-8.93	8.99
3	SDL	-41.77	20.18	-43.31	-8.91	9.01
4	SDL	-43.31	22.95	-36.24	-9.21	8.71
5	SDL	-36.24	10.76	0.00	-7.99	4.17
CANT	XL	-----	-----	0.00	-----	0.00
1	XL	0.00	0.00	0.00	0.00	0.00
2	XL	0.00	0.00	0.00	0.00	0.00
3	XL	0.00	0.00	0.00	0.00	0.00
4	XL	0.00	0.00	0.00	0.00	0.00
5	XL	0.00	0.00	0.00	0.00	0.00

5.2 Reactions and Column Moments (Excluding Live Load)

Joint	Load Case	Reaction	Moment Lower Column	Moment Upper Column
		k	k-ft	k-ft
1	SW	105.17	0.00	0.00
2	SW	110.62	0.00	0.00
3	SW	111.86	0.00	0.00
4	SW	113.92	0.00	0.00
5	SW	104.34	0.00	0.00
6	SW	26.08	0.00	0.00
1	SDL	26.11	0.00	0.00
2	SDL	17.70	0.00	0.00
3	SDL	17.90	0.00	0.00
4	SDL	18.23	0.00	0.00
5	SDL	16.69	0.00	0.00
6	SDL	4.17	0.00	0.00
1	XL	0.00	0.00	0.00
2	XL	0.00	0.00	0.00
3	XL	0.00	0.00	0.00
4	XL	0.00	0.00	0.00
5	XL	0.00	0.00	0.00
6	XL	0.00	0.00	0.00

5.3 Span Moments and Shears (Live Load)

Span	Moment Left Max	Moment Left Min	Moment Midspan Max	Moment Midspan Min	Moment Right Max	Moment Right Min	Shear Left	Shear Right
	k-ft	k-ft	k-ft	k-ft	k-ft	k-ft	k	k
CL	-----	-----	-----	-----	-115.20	-----	-----	22.40
1	-115.20	0.00	123.21	-75.06	-149.61	-13.51	-25.05	27.74
2	-149.61	-13.52	109.89	-56.34	-144.28	-30.17	-26.67	27.07
3	-144.28	-30.17	101.70	-51.24	-135.19	-37.91	-26.20	26.00
4	-135.19	-37.90	94.67	-37.31	-109.98	-9.94	-25.33	24.78
5	-109.98	-9.94	67.23	-40.33	0.00	0.00	-20.99	14.68

5.4 Reactions and Column Moments (Live Load)

Joint	Reaction Max	Reaction Min	Moment Lower Column Max	Moment Lower Column Min	Moment Upper Column Max	Moment Upper Column Min
	k	k	k-ft	k-ft	k-ft	k-ft

1	47.45	17.06	0.00	0.00	0.00	0.00
2	54.41	14.10	0.00	0.00	0.00	0.00
3	53.27	17.66	0.00	0.00	0.00	0.00
4	51.33	19.31	0.00	0.00	0.00	0.00
5	45.76	13.77	0.00	0.00	0.00	0.00
6	14.68	-4.25	0.00	0.00	0.00	0.00

6 - MOMENTS REDUCED TO FACE OF SUPPORT

6.1 Reduced Moments at Face of Support (Excluding Live Load)

Span	Load Case	Moment Left	Moment Midspan	Moment Right
		k-ft	k-ft	k-ft
CANT	SW	-----	-----	-264.50
1	SW	-259.92	120.42	-228.33
2	SW	-227.83	133.83	-233.42
3	SW	-233.75	126.17	-243.00
4	SW	-242.42	143.42	-199.75
5	SW	-202.00	67.26	12.54
CANT	SDL	-----	-----	-42.32
1	SDL	-41.58	19.26	-36.53
2	SDL	-36.46	21.42	-37.35
3	SDL	-37.39	20.18	-38.88
4	SDL	-38.78	22.95	-31.97
5	SDL	-32.33	10.76	2.01
CANT	XL	-----	-----	0.00
1	XL	0.00	0.00	0.00
2	XL	0.00	0.00	0.00
3	XL	0.00	0.00	0.00
4	XL	0.00	0.00	0.00
5	XL	0.00	0.00	0.00

6.2 Reduced Moments at Face of Support (Live Load)

Span	Moment Left Max	Moment Left Min	Moment Midspan Max	Moment Midspan Min	Moment Right Max	Moment Right Min
	k-ft	k-ft	k-ft	k-ft	k-ft	k-ft
CL	-----	-----	-----	-----	-105.83	-----
1	-113.75	9.80	123.25	-75.06	-135.92	-15.32
2	-136.50	-4.85	109.92	-56.34	-130.92	-21.31
3	-131.42	-25.18	101.67	-51.24	-122.42	-28.81
4	-122.75	-33.25	94.67	-37.31	-97.83	-10.92
5	-99.67	-2.28	67.23	-40.33	-2.12	7.14

7 - SELECTED POST-TENSIONING FORCES AND TENDON PROFILES

7.1 Tendon Profile

Tendon A

Span	Type	X1/L	X2/L	X3/L	A/L
CL	1	---	---	0.000	---
1	1	0.100	0.500	0.100	---
2	1	0.100	0.500	0.100	---
3	1	0.100	0.500	0.100	---
4	1	0.100	0.500	0.100	---
5	1	0.100	0.500	0.100	---

Tendon B

Span	Type	X1/L	X2/L	X3/L	A/L
CL	1	---	---	0.100	---
1	1	0.100	0.500	0.100	---
2	1	0.100	0.500	0.100	---
3	1	0.100	0.500	0.100	---
4	1	0.100	0.500	0.100	---
5	1	0.100	0.500	0.100	---

7.2 Selected Post-Tensioning Forces and Tendon Drape

Tendon A

Span	Force	CGS Left	CGS C1	CGS C2	CGS Right	P/A	Wbal	WBal (%DL)
	k	in	in	in	in	psi	k/-	
CL	1216.000	-5.00	---	---	-1.00	316.67	5.630	104
1	1216.000	-1.00	---	-9.00	-1.00	316.67	8.272	178
2	1216.000	-1.00	---	-9.00	-1.00	316.67	8.272	178
3	1216.000	-1.00	---	-9.00	-1.00	316.67	8.272	178
4	1216.000	-1.00	---	-9.00	-1.00	316.67	8.272	178
5	1216.000	-1.00	---	-8.25	-5.00	316.67	11.789	254

Tendon B

Span	Force	CGS Left	CGS C1	CGS C2	CGS Right	P/A	Wbal	WBal (%DL)
	k	in	in	in	in	psi	k/-	
CL	384.000	-5.00	---	---	-1.00	100.00	1.778	33
1	384.000	-1.00	---	-9.00	-5.00	100.00	1.959	42
2	0.000	-5.00	---	-9.00	-1.00	0.00	0.000	0
3	0.000	-1.00	---	-9.00	-1.00	0.00	0.000	0
4	0.000	-1.00	---	-9.00	-1.00	0.00	0.000	0
5	0.000	-1.00	---	-8.25	-5.00	0.00	0.000	0

All Tendons

Span	Force	Total P/A	Total WBal (%DL)
	k	psi	
CL	1600	416.67	137
1	1600	416.67	220
2	1216	316.67	178
3	1216	316.67	178
4	1216	316.67	178
5	1216	316.67	254

Approximate weight of strand: 3732.5 LB

7.4 Required Minimum Post-Tensioning Forces

	Based on Stress Conditions			Based on Minimum P/A		
Type	Left	Center	Right	Left	Center	Right
	k	k	k	k	k	k
CL	-----	-----	418.81	-----	-----	480.00
1	402.28	86.68	358.21	480.00	480.00	480.00
2	357.35	102.07	337.54	480.00	480.00	480.00
3	339.93	52.90	330.07	480.00	480.00	480.00
4	329.23	86.41	192.71	480.00	480.00	480.00
5	203.26	0.00	0.00	480.00	480.00	480.00

7.5 Service Stresses (tension shown positive)

Envelope of Service 1

Span	Left Top Max-T	Left Top Max-C	Left Bot Max-T	Left Bot Max-C	Center Top Max-T	Center Top Max-C	Cetner Bot Max-T	Cetner Bot Max-C	Right Top Max-T	Right Top Max-C	Right Bot Max-T	Right Bot Max-C
	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi
CL	-----	-----	-----	-----	-----	-----	-----	-----	-----	-759.79	-----	-271.98

1	-----	-862.36	29.03	-202.63	311.51	-60.25	-----	-1144.84	-----	-936.17	102.84	-123.27
2	-----	-960.46	127.13	-119.72	49.84	-261.85	-----	-683.18	-----	-637.22	3.89	-201.63
3	-----	-626.80	-----	-205.72	125.95	-160.82	-----	-759.28	-----	-647.21	13.87	-161.64
4	-----	-640.88	7.54	-160.27	42.13	-205.34	-----	-675.46	-----	-766.97	133.64	-29.33
5	-----	-764.66	131.33	-51.28	152.78	-48.89	-----	-786.11	-----	-352.86	-----	-297.84

7.6 Post-Tensioning Balance Moments, Shears and Reactions

Span Moments and Shears

Span	Moment Left	Moment Center	Moment Right	Shear Left	Shear Right
	k-ft	k-ft	k-ft	k	k
CL	-----	-----	489.83	-----	85.19
1	529.42	-452.92	557.25	-5.74	-5.74
2	559.17	-294.42	463.00	3.56	3.56
3	461.75	-331.17	487.00	-0.94	-0.94
4	487.33	-320.42	482.83	0.17	0.17
5	475.50	-288.08	-2.38	4.34	4.34

Reactions and Column Moments

Joint	Reaction	Moment Lower Column	Moment Upper Column
	k	k-ft	k-ft
1	5.742	0.000	0.000
2	-9.303	0.000	0.000
3	4.496	0.000	0.000
4	-1.104	0.000	0.000
5	-4.175	0.000	0.000
6	4.344	0.000	0.000

Note: Moments are reported at face of support

8 - FACTORED MOMENTS AND REACTIONS ENVELOPE

8.1 Factored Design Moments (Not Redistributed)

Span	Left Max	Left Min	Middle Max	Middle Min	Right Max	Right Min
	k-ft	k-ft	k-ft	k-ft	k-ft	k-ft
CL	-----	-----	-----	-----	-609.46	-----
1	-612.60	-402.57	485.46	148.34	-443.95	-238.95
2	-443.06	-219.25	515.13	232.49	-538.78	-352.45
3	-541.47	-360.88	451.89	191.95	-515.91	-356.78
4	-515.19	-363.04	478.76	254.41	-408.10	-260.35
5	-417.12	-251.56	264.79	81.94	18.93	34.67

8.2 Reactions and Column Moments

Joint	Reaction Max	Reaction Min	Moment Lower Column Max	Moment Lower Column Min	Moment Upper Column Max	Moment Upper Column Min
	k	k	k-ft	k-ft	k-ft	k-ft
1	270.24	218.58	0.00	0.00	0.00	0.00
2	262.81	194.29	0.00	0.00	0.00	0.00
3	276.77	216.24	0.00	0.00	0.00	0.00
4	271.14	216.71	0.00	0.00	0.00	0.00
5	243.00	188.62	0.00	0.00	0.00	0.00
6	71.65	39.48	0.00	0.00	0.00	0.00

8.3 Secondary Moments

Span	Left	Midspan	Right
	k-ft	k-ft	k-ft
1	2.87	80.39	157.92

2	159.00	110.92	62.85
3	61.53	74.17	86.83
4	87.17	84.92	82.62
5	80.37	41.27	2.17

8.4 Factored Design Moments (Redistributed)

Span	Left Max	Left Min	Middle Max	Middle Min	Right Max	Right Min	Redist. Coef. Left	Redist. Coef Right
	k-ft	k-ft	k-ft	k-ft	k-ft	k-ft		
CL	-0.00	-0.00	-202.74	-142.90	-615.55	-433.84	0.00	0.00
1	-617.42	-405.89	510.06	186.68	-375.95	-202.35	0.00	16.45
2	-374.03	-200.84	562.42	324.65	-438.12	-292.38	16.28	18.09
3	-437.60	-291.69	526.34	300.57	-416.79	-293.22	20.00	18.61
4	-417.39	-293.69	546.48	346.20	-336.53	-209.98	19.88	20.00
5	-339.25	-211.51	289.28	124.87	36.17	21.34	20.00	0.00

Note: Moments are reported at face of support

10 - MILD STEEL - NO REDISTRIBUTION

10.1 Required Rebar

10.1.1 Total Strip Required Rebar

Span	Location	From	To	As Required	Ultimate	Minimum
		ft	ft	in2	in2	in2
1	TOP	9.80	16.80	4.47	0.00	4.47
5	TOP	7.60	9.50	1.79	0.00	1.79
1	BOT	26.60	28.00	0.44	0.00	0.44
2	BOT	0.00	1.40	0.63	0.00	0.63
4	BOT	1.40	1.40	0.04	0.00	0.04
4	BOT	26.60	28.00	1.46	0.00	1.46
5	BOT	0.00	0.95	0.81	0.00	0.81

10.2 Provided Rebar

10.2.1 Total Strip Provided Rebar

Span	ID	Location	From	Quantity	Size	Length	Area
			ft			ft	in2
1	1	TOP	8.40	6	6	10.00	2.64
5	2	TOP	6.65	5	6	4.00	2.20
1	3	TOP	8.40	5	6	8.50	2.20
1	4	BOT	25.20	2	4	6.00	0.40
4	5	BOT	0.50	1	4	2.50	0.20
4	6	BOT	25.20	4	4	5.00	0.80
1	7	BOT	26.60	2	4	4.50	0.40
4	8	BOT	25.20	4	4	4.00	0.80

10.2.2 Total Strip Steel Disposition

Span	ID	Location	From	Quantity	Size	Length
			ft			ft
1	1	TOP	8.40	6	6	10.00
1	3	TOP	8.40	5	6	8.50
5	2	TOP	6.65	5	6	4.00
1	4	BOT	25.20	2	4	2.80
1	7	BOT	26.60	2	4	1.40
2	4	BOT	0.00	2	4	3.20
2	7	BOT	0.00	2	4	3.10
4	5	BOT	0.50	1	4	2.50

4	6	BOT	25.20	4	4	2.80
4	8	BOT	25.20	4	4	2.80
5	6	BOT	0.00	4	4	2.20
5	8	BOT	0.00	4	4	1.20

11 - MILD STEEL - REDISTRIBUTED

11.1 Required Rebar

11.1.1 Total Strip Required Rebar

Span	Location	From	To	As Required	Ultimate	Minimum
		ft	ft	in2	in2	in2
1	TOP	9.80	16.80	4.47	0.00	4.47
5	TOP	7.60	9.50	1.79	0.00	1.79
1	BOT	26.60	28.00	0.44	0.00	0.44
2	BOT	0.00	1.40	0.63	0.00	0.63
4	BOT	1.40	1.40	0.04	0.00	0.04
4	BOT	26.60	28.00	1.46	0.00	1.46
5	BOT	0.00	0.95	0.81	0.00	0.81

11.2 Provided Rebar

11.2.1 Total Strip Provided Rebar

Span	ID	Location	From	Quantity	Size	Length	Area
			ft			ft	in2
1	1	TOP	8.40	6	6	10.00	2.64
5	2	TOP	6.65	5	6	4.00	2.20
1	3	TOP	8.40	5	6	8.50	2.20
1	4	BOT	25.20	2	4	6.00	0.40
4	5	BOT	0.50	1	4	2.50	0.20
4	6	BOT	25.20	4	4	5.00	0.80
1	7	BOT	26.60	2	4	4.50	0.40
4	8	BOT	25.20	4	4	4.00	0.80

11.2.2 Total Strip Steel Disposition

Span	ID	Location	From	Quantity	Size	Length
			ft			ft
1	1	TOP	8.40	6	6	10.00
1	3	TOP	8.40	5	6	8.50
5	2	TOP	6.65	5	6	4.00
1	4	BOT	25.20	2	4	2.80
1	7	BOT	26.60	2	4	1.40
2	4	BOT	0.00	2	4	3.20
2	7	BOT	0.00	2	4	3.10
4	5	BOT	0.50	1	4	2.50
4	6	BOT	25.20	4	4	2.80
4	8	BOT	25.20	4	4	2.80
5	6	BOT	0.00	4	4	2.20
5	8	BOT	0.00	4	4	1.20

10.3 - Base Reinforcement

10.3.1 Isolated bars

Span	Location	From	Quantity	Size	Cover	Length	Area
--	--	ft	--	--	in	ft	in2
CL	TOP	6.24	8	6	.75	11.92	3.52

1	TOP	21.84	8	6	.75	12.32	3.52
2	TOP	21.84	8	6	.75	12.32	3.52
3	TOP	21.84	8	6	.75	11.76	3.52
4	TOP	21.84	8	6	.75	12.81	3.52
5	TOP	12.35	8	6	.75	6.65	3.52

10.3.2 Mesh Reinforcement

#	Span	Location	From	Spacing	Size	Cover	Length	Area
--	--	--	ft	in	--	in	ft	in2
1	CL	BOT	.00	24.00	4	.75	12.00	3.20
	1	BOT	.00	24.00	4	.75	28.00	3.20
	2	BOT	.00	24.00	4	.75	28.00	3.20
	3	BOT	.00	24.00	4	.75	28.00	3.20
	4	BOT	.00	24.00	4	.75	28.00	3.20
	5	BOT	.00	24.00	4	.75	19.00	3.20

13 - PUNCHING SHEAR REINFORCEMENT

13.1 Critical Section Geometry

Column	Layer	Cond.	a	d	b1	b2
			in	in	in	in
1	1	1	4.13	8.25	20.25	20.25
2	1	1	4.13	8.25	20.25	20.25
3	1	1	4.13	8.25	20.25	20.25
4	1	1	4.13	8.25	20.25	20.25
5	1	1	4.13	8.25	20.25	20.25
6	1	2	4.13	8.25	16.13	20.25

13.2 Critical Section Stresses

Label	Layer	Cond.	Factored shear	Factored moment	Stress due to shear	Stress due to moment	Total stress	Allowable stress	Stress ratio
			k	k-ft	ksi	ksi	ksi	ksi	
1	1	1	-270.19	+0.00	0.40	0.000	0.404	0.317	1.277
2	1	1	-262.85	+0.14	0.39	0.000	0.393	0.317	1.243
3	1	1	-276.71	+0.00	0.41	0.000	0.414	0.291	1.422
4	1	1	-271.16	+0.00	0.41	0.000	0.406	0.291	1.394
5	1	1	-243.10	+0.00	0.36	0.000	0.364	0.291	1.250
6	1	2	-71.64	-0.00	0.17	0.049	0.214	0.240	0.892

13.3 Punching Shear Reinforcement

Reinforcement option: Stirrups

Bar Size: 4

Col.	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs
	in		in		in		in		in	
1	***	***								
2	***	***								
3	***	***								
4	***	***								
5	***	***								
6										

Dist. = Distance measured from the face of support

Note: Columns with --- have not been checked for punching shear.

Note: Columns with *** have exceeded the maximum allowable shear stress.

14 - DEFLECTIONS

14.1 Maximum Span Deflections

Span	SW	SW+PT	SW+PT+ SDL	SW+PT+SDL +Creep	LL	X	Total
	in	in	in	in	in	in	in
CL	0.17	0.05	0.08	0.25(580)	0.07(2067)	0.00(*****)	0.32(453)
1	0.07	-0.25	-0.24	-0.71(471)	0.03(11745)	0.00(*****)	-0.68(490)
2	0.09	-0.08	-0.06	-0.19(1805)	0.04(9417)	0.00(*****)	-0.15(2222)
3	0.08	-0.13	-0.12	-0.36(921)	0.03(10616)	0.00(*****)	-0.33(1009)
4	0.10	-0.10	-0.08	-0.24(1380)	0.04(8242)	0.00(*****)	-0.20(1658)
5	0.03	-0.08	-0.08	-0.24(934)	0.01(22711)	0.00(*****)	-0.24(970)

16 - Unbalanced Moment Reinforcement

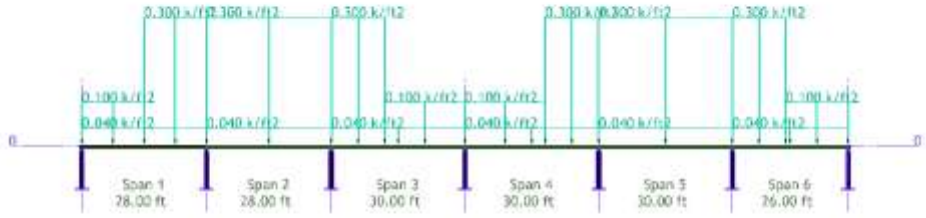
16.1 Unbalanced Moment Reinforcement - No Redistribution

Joint	Gamma Left	Gamma Right	Width Left	Width Right	Moment Left Neg	Moment Left Pos	Moment Right Neg	Moment Right Pos	As Top	As Bot	n Bar Top	n Bar Bot
			ft	ft	k-ft	k-ft	k-ft	k-ft	in2	in2		
1	0.60	0.60	3.50	3.50	-26.97	0.00	-3.15	0.00	0.00	0.00	0	0
2	0.60	0.60	3.50	3.50	-19.72	0.00	0.00	0.00	0.00	0.00	0	0
3	0.60	0.60	3.50	3.50	0.00	0.00	-8.42	0.00	0.00	0.00	0	0
4	0.60	0.60	3.50	3.50	-0.77	0.00	-6.22	0.00	0.00	0.00	0	0
5	0.60	0.60	3.50	3.50	-8.78	0.00	-9.02	0.00	0.00	0.00	0	0
6	0.60	0.00	3.50	0.00	0.00	34.67	0.00	0.00	0.00	0.00	0	0

16.2 Unbalanced Moment Reinforcement - Redistributed

Joint	Gamma Left	Gamma Right	Width Left	Width Right	Moment Left Neg	Moment Left Pos	Moment Right Neg	Moment Right Pos	As Top	As Bot	n Bar Top	n Bar Bot
			ft	ft	k-ft	k-ft	k-ft	k-ft	in2	in2		
1	0.60	0.60	3.50	3.50	-27.24	0.00	-3.18	0.00	0.00	0.00	0	0
2	0.60	0.60	3.50	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0	0
3	0.60	0.60	3.50	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0	0
4	0.60	0.60	3.50	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0	0
5	0.60	0.60	3.50	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0	0
6	0.60	0.00	3.50	0.00	0.00	35.02	0.00	0.00	0.00	0.00	0	0

Courthouse Square
Lvl G. Band. Grid L w/ full live load



Tuesday, March 08, 2011

1 - USER SPECIFIED GENERAL ANALYSIS AND DESIGN PARAMETERS

Parameter	Value	Parameter	Value
Concrete		Minimum Cover at BOTTOM	1.00 in
F'c for BEAMS/SLABS	5000.00 psi	Post-tensioning	
For COLUMNS/WALLS	5000.00 psi	SYSTEM	UNBONDED
Ec for BEAMS/SLABS	4031.00 ksi	Fpu	270.00 ksi
For COLUMNS/WALLS	4031.00 ksi	Fse	175.00 ksi
CREEP factor	2.00	Strand area	0.153 in 2
CONCRETE WEIGHT	NORMAL	Min CGS from TOP	1.00 in
UNIT WEIGHT	150.00 pcf	Min CGS from BOT for interior spans	1.00 in
Tension stress limits / (f'c)1/2		Min CGS from BOT for exterior spans	1.75 in
At Top	6.000	Min average precompression	125.00 psi
At Bottom	6.000	Max spacing / slab depth	8.00
Compression stress limits / f'c		Analysis and design options	
At all locations	0.450	Structural system - Equiv Frame	TWO-WAY
Reinforcement		Moments reduced to face of support	YES
Fy (Main bars)	60.00 ksi	Moment Redistribution	YES
Fy (Shear reinforcement)	60.00 ksi	DESIGN CODE SELECTED	ACI-318 (1999)
Minimum Cover at TOP	1.00 in		

2 - INPUT GEOMETRY

2.1 Principal Span Data of Uniform Spans

Span	Form	Length	Width	Depth	TF Width	TF Thick.	BF/MF Width	BF/MF Thick.	Rh	Right Mult.	Left Mult.
		ft	in	in	in	in	in	in	in		
1	1	28.00	12.00	10.00					0.00	14.00	14.00
2	1	28.00	12.00	10.00					0.00	14.00	14.00
3	1	30.00	12.00	10.00					0.00	14.00	14.00
4	1	30.00	12.00	10.00					0.00	14.00	14.00
5	1	30.00	12.00	10.00					0.00	14.00	14.00
6	1	26.00	12.00	10.00					0.00	14.00	14.00

2.7 Support Width and Column Data

Joint	Support Width	Length LC	B(DIA.) LC	D LC	% LC	CBC LC	Length UC	B(DIA.) UC	D UC	% UC	CBC UC
	in	ft	in	in			ft	in	in		
1	12.0	9.3	12.0	12.0	100	(2)					
2	12.0	9.3	12.0	12.0	100	(2)					
3	12.0	9.3	12.0	12.0	100	(2)					
4	12.0	9.3	12.0	12.0	100	(2)					
5	12.0	9.3	12.0	12.0	100	(2)					
6	12.0	9.3	12.0	12.0	100	(2)					
7	12.0	9.3	12.0	12.0	100	(2)					

3 - INPUT APPLIED LOADING

3.1 Loading As Appears in User's Input Screen

Span	Class	Type	W	P1	P2	A	B	C	F	M
			k/ft2	k/ft	k/ft	ft	ft	ft	k	k-ft
1	LL	P	0.100			0.000	14.000			
1	LL	P	0.300			14.000	28.000			
1	SDL	U	0.040							
2	LL	U	0.300							

2	SDL	U	0.040							
3	LL	P	0.300			0.000	12.000			
3	LL	P	0.100			12.000	30.000			
3	SDL	U	0.040							
4	LL	P	0.100			0.000	18.000			
4	LL	P	0.300			18.000	30.000			
4	SDL	U	0.040							
5	LL	U	0.300							
5	SDL	U	0.040							
6	LL	P	0.300			0.000	12.000			
6	LL	P	0.100			12.000	26.000			
6	SDL	U	0.040							

NOTE: SELFWEIGHT INCLUSION REQUIRED (SW= SELF WEIGHT Computed from geometry input and treated as dead loading. Unit selfweight W = 150.0 pcf
NOTE: LIVE LOADING is SKIPPED with a skip factor of 1.00

3.2 Compiled loads

Span	Class	Type	P1	P2	F	M	A	B	C	Reduction Factor
			k/ft	k/ft	k	k-ft	ft	ft	ft	%
1	LL	P	2.800				0.000	14.000		0.000
1	LL	P	8.400				14.000	28.000		0.000
1	SDL	U	1.120							
1	SW	U	3.500							
2	LL	U	8.400							0.000
2	SDL	U	1.120							
2	SW	U	3.500							
3	LL	P	8.400				0.000	12.000		0.000
3	LL	P	2.800				12.000	30.000		0.000
3	SDL	U	1.120							
3	SW	U	3.500							
4	LL	P	2.800				0.000	18.000		0.000
4	LL	P	8.400				18.000	30.000		0.000
4	SDL	U	1.120							
4	SW	U	3.500							
5	LL	U	8.400							0.000
5	SDL	U	1.120							
5	SW	U	3.500							
6	LL	P	8.400				0.000	12.000		0.000
6	LL	P	2.800				12.000	26.000		0.000
6	SDL	U	1.120							
6	SW	U	3.500							

4 - CALCULATED SECTION PROPERTIES

4.1 Section Properties of Uniform Spans and Cantilevers

Span	Area	I	Yb	Yt
	in2	in4	in	in
1	3360.00	0.28E+05	5.00	5.00
2	3360.00	0.28E+05	5.00	5.00
3	3360.00	0.28E+05	5.00	5.00
4	3360.00	0.28E+05	5.00	5.00
5	3360.00	0.28E+05	5.00	5.00
6	3360.00	0.28E+05	5.00	5.00

5 - MOMENTS, SHEARS AND REACTIONS

5.1 Span Moments and Shears (Excluding Live Load)

Span	Load Case	Moment Left	Moment Midspan	Moment Right	Shear Left	Shear Right
		k-ft	k-ft	k-ft	k	k
1	SW	0.00	199.89	-286.23	-38.78	59.22
2	SW	-286.23	84.83	-230.11	-51.00	47.00
3	SW	-230.11	142.28	-272.84	-51.08	53.92
4	SW	-272.84	129.34	-255.99	-53.06	51.94
5	SW	-255.99	125.55	-280.41	-51.69	53.31
6	SW	-280.41	155.54	0.00	-56.29	34.71
1	SDL	0.00	63.96	-91.59	-12.41	18.95
2	SDL	-91.59	27.15	-73.64	-16.32	15.04
3	SDL	-73.63	45.53	-87.31	-16.34	17.26
4	SDL	-87.31	41.39	-81.92	-16.98	16.62
5	SDL	-81.92	40.18	-89.73	-16.54	17.06
6	SDL	-89.73	49.77	0.00	-18.01	11.11
1	XL	0.00	0.00	0.00	0.00	0.00
2	XL	0.00	0.00	0.00	0.00	0.00
3	XL	0.00	0.00	0.00	0.00	0.00
4	XL	0.00	0.00	0.00	0.00	0.00
5	XL	0.00	0.00	0.00	0.00	0.00
6	XL	0.00	0.00	0.00	0.00	0.00

5.2 Reactions and Column Moments (Excluding Live Load)

Joint	Load Case	Reaction	Moment Lower Column	Moment Upper Column
		k	k-ft	k-ft
1	SW	38.78	0.00	0.00
2	SW	110.23	0.00	0.00
3	SW	98.07	0.00	0.00
4	SW	106.99	0.00	0.00
5	SW	103.62	0.00	0.00
6	SW	109.60	0.00	0.00
7	SW	34.71	0.00	0.00
1	SDL	12.41	0.00	0.00
2	SDL	35.27	0.00	0.00
3	SDL	31.38	0.00	0.00
4	SDL	34.24	0.00	0.00
5	SDL	33.16	0.00	0.00
6	SDL	35.07	0.00	0.00
7	SDL	11.11	0.00	0.00
1	XL	0.00	0.00	0.00
2	XL	0.00	0.00	0.00
3	XL	0.00	0.00	0.00
4	XL	0.00	0.00	0.00
5	XL	0.00	0.00	0.00
6	XL	0.00	0.00	0.00
7	XL	0.00	0.00	0.00

5.3 Span Moments and Shears (Live Load)

Span	Moment Left Max	Moment Left Min	Moment Midspan Max	Moment Midspan Min	Moment Right Max	Moment Right Min	Shear Left	Shear Right
	k-ft	k-ft	k-ft	k-ft	k-ft	k-ft	k	k
1	-0.01	0.01	428.97	-170.89	-645.85	-239.67	-50.24	121.07
2	-645.85	-239.68	510.84	-224.76	-629.81	-119.66	-132.23	131.00
3	-629.82	-119.65	355.32	-204.54	-439.13	-15.75	-116.23	66.09

4	-439.13	-15.75	346.26	-226.91	-673.26	-130.35	-65.73	117.44
5	-673.26	-130.36	566.46	-189.03	-646.16	-163.52	-137.55	137.28
6	-646.16	-163.53	356.44	-207.99	0.00	0.00	-112.94	45.62

5.4 Reactions and Column Moments (Live Load)

Joint	Reaction Max	Reaction Min	Moment Lower Column Max	Moment Lower Column Min	Moment Upper Column Max	Moment Upper Column Min
	k	k	k-ft	k-ft	k-ft	k-ft
1	50.24	-12.21	0.00	0.00	0.00	0.00
2	253.30	107.63	0.00	0.00	0.00	0.00
3	247.22	80.02	0.00	0.00	0.00	0.00
4	131.82	25.24	0.00	0.00	0.00	0.00
5	254.99	83.61	0.00	0.00	0.00	0.00
6	250.23	92.68	0.00	0.00	0.00	0.00
7	45.62	-16.00	0.00	0.00	0.00	0.00

6 - MOMENTS REDUCED TO FACE OF SUPPORT

6.1 Reduced Moments at Face of Support (Excluding Live Load)

Span	Load Case	Moment Left	Moment Midspan	Moment Right
		k-ft	k-ft	k-ft
1	SW	18.95	199.92	-257.08
2	SW	-261.17	84.83	-207.08
3	SW	-205.00	142.25	-246.33
4	SW	-246.75	129.33	-230.50
5	SW	-230.58	125.58	-254.17
6	SW	-252.75	155.58	16.92
1	SDL	6.07	63.97	-82.26
2	SDL	-83.58	27.14	-66.26
3	SDL	-65.60	45.52	-78.82
4	SDL	-78.96	41.39	-73.75
5	SDL	-73.79	40.17	-81.34
6	SDL	-80.87	49.77	5.41
1	XL	0.00	0.00	0.00
2	XL	0.00	0.00	0.00
3	XL	0.00	0.00	0.00
4	XL	0.00	0.00	0.00
5	XL	0.00	0.00	0.00
6	XL	0.00	0.00	0.00

6.2 Reduced Moments at Face of Support (Live Load)

Span	Moment Left Max	Moment Left Min	Moment Midspan Max	Moment Midspan Min	Moment Right Max	Moment Right Min
	k-ft	k-ft	k-ft	k-ft	k-ft	k-ft
1	-6.11	24.77	429.00	-170.92	-586.33	-187.42
2	-580.75	-203.67	510.83	-224.75	-565.33	-122.17
3	-572.75	-78.14	355.33	-204.50	-406.42	1.38
4	-406.58	-6.29	346.25	-226.92	-615.58	-88.67
5	-605.50	-131.25	566.42	-189.00	-578.58	-164.33
6	-590.75	-117.42	356.42	-208.00	-8.00	22.46

7 - SELECTED POST-TENSIONING FORCES AND TENDON PROFILES

7.1 Tendon Profile

Tendon A

Span	Type	X1/L	X2/L	X3/L	A/L
1	1	0.100	0.500	0.100	---
2	1	0.100	0.500	0.100	---
3	1	0.100	0.500	0.100	---
4	1	0.100	0.500	0.100	---
5	1	0.100	0.500	0.100	---
6	1	0.100	0.500	0.100	---

7.2 Selected Post-Tensioning Forces and Tendon Drape

Tendon A

Span	Force	CGS Left	CGS C1	CGS C2	CGS Right	P/A	Wbal	WBal (%DL)
	k	in	in	in	in	psi	k/-	
1	1426.000	-5.00	---	-8.25	-1.50	424.40	6.063	131
2	1426.000	-1.50	---	-8.25	-1.50	424.40	8.185	177
3	1056.000	-1.50	---	-8.25	-1.50	314.29	5.280	114
4	1056.000	-1.50	---	-5.00	-1.50	314.29	2.738	59
5	1056.000	-1.50	---	-9.00	-1.50	314.29	5.867	127
6	1056.000	-1.50	---	-5.00	-5.00	314.29	1.822	39

All Tendons

Span	Force	Total P/A	Total WBal (%DL)
	k	psi	
1	1426	424.4	131
2	1426	424.4	177
3	1056	314.29	114
4	1056	314.29	59
5	1056	314.29	127
6	1056	314.29	39

Approximate weight of strand: 3978.5 LB

7.4 Required Minimum Post-Tensioning Forces

	Based on Stress Conditions			Based on Minimum P/A		
Type	Left	Center	Right	Left	Center	Right
	k	k	k	k	k	k
1	0.00	1322.23	1465.15	420.00	420.00	420.00
2	1462.61	1202.36	1365.14	420.00	420.00	420.00
3	1378.86	832.53	1468.67	420.00	420.00	420.00
4	1468.87	1816.49	1715.96	420.00	420.00	420.00
5	1695.45	1121.70	1680.07	420.00	420.00	420.00
6	1698.39	2612.07	0.00	420.00	420.00	420.00

7.5 Service Stresses (tension shown positive)

Envelope of Service 1

Span	Left Top Max-T	Left Top Max-C	Left Bot Max-T	Left Bot Max-C	Center Top Max-T	Center Top Max-C	Cetner Bot Max-T	Cetner Bot Max-C	Right Top Max-T	Right Top Max-C	Right Bot Max-T	Right Bot Max-C
	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi
1	-----	-529.69	-----	-385.30	95.57	-1189.85	341.04	-944.38	465.95	-388.87	-----	-1314.76
2	463.28	-344.75	-----	-1312.09	472.55	-1103.73	254.92	-1321.36	363.07	-586.57	-----	-1211.88
3	377.02	-682.86	-----	-1225.82	345.38	-854.32	225.75	-973.95	745.53	-128.33	-----	-1374.10
4	746.08	-111.70	-----	-1374.65	-----	-1339.01	710.44	-517.78	1019.16	-109.94	-----	-1647.73
5	999.55	-16.70	-----	-1628.12	499.03	-1119.88	491.31	-1127.60	994.27	-----	-----	-1622.84
6	1013.03	-1.25	-----	-1641.61	-----	-1517.20	888.63	-320.86	-----	-410.23	-----	-283.60

7.6 Post-Tensioning Balance Moments, Shears and Reactions

Span Moments and Shears

Span	Moment Left	Moment Center	Moment Right	Shear Left	Shear Right

	k-ft	k-ft	k-ft	k	k
1	-0.66	-335.58	510.17	-3.61	-3.61
2	511.25	-305.83	471.17	1.48	1.48
3	469.33	-291.08	237.00	4.32	4.32
4	237.42	-38.78	297.58	-2.07	-2.07
5	296.75	-356.25	303.42	-0.23	-0.23
6	304.92	-0.39	-0.02	-0.03	-0.03

Reactions and Column Moments

Joint	Reaction	Moment Lower Column	Moment Upper Column
	k	k-ft	k-ft
1	3.614	0.000	0.000
2	-5.097	0.000	0.000
3	-2.834	0.000	0.000
4	6.390	0.000	0.000
5	-1.842	0.000	0.000
6	-0.200	0.000	0.000
7	-0.030	0.000	0.000

Note: Moments are reported at face of support

8 - FACTORED MOMENTS AND REACTIONS ENVELOPE

8.1 Factored Design Moments (Not Redistributed)

Span	Left Max	Left Min	Middle Max	Middle Min	Right Max	Right Min
	k-ft	k-ft	k-ft	k-ft	k-ft	k-ft
1	26.44	78.95	1149.34	129.48	-1372.43	-694.27
2	-1369.51	-728.47	1105.61	-144.88	-1283.34	-529.95
3	-1295.01	-454.17	861.85	-89.87	-1213.83	-520.57
4	-1216.02	-535.51	788.86	-185.53	-1481.17	-585.42
5	-1463.06	-656.83	1190.73	-93.48	-1454.20	-749.98
6	-1472.11	-667.44	893.02	-66.49	17.66	69.43

8.2 Reactions and Column Moments

Joint	Reaction Max	Reaction Min	Moment Lower Column Max	Moment Lower Column Min	Moment Upper Column Max	Moment Upper Column Min
	k	k	k-ft	k-ft	k-ft	k-ft
1	160.69	54.52	0.00	0.00	0.00	0.00
2	629.17	381.48	0.00	0.00	0.00	0.00
3	598.64	314.43	0.00	0.00	0.00	0.00
4	428.19	247.03	0.00	0.00	0.00	0.00
5	623.12	331.76	0.00	0.00	0.00	0.00
6	627.68	359.89	0.00	0.00	0.00	0.00
7	141.67	36.92	0.00	0.00	0.00	0.00

8.3 Secondary Moments

Span	Left	Midspan	Right
	k-ft	k-ft	k-ft
1	1.81	50.60	99.42
2	100.42	80.43	60.41
3	57.51	-5.10	-67.71
4	-68.83	-38.78	-8.73
5	-7.58	-4.24	-0.90
6	-0.77	-0.39	-0.02

8.4 Factored Design Moments (Redistributed)

Span	Left Max	Left Min	Middle Max	Middle Min	Right Max	Right Min	Redist. Coef. Left	Redist. Coef Right
	k-ft	k-ft	k-ft	k-ft	k-ft	k-ft		
1	81.15	29.44	1200.55	207.19	-1236.06	-623.16	0.00	11.34
2	-1233.43	-622.29	1215.07	0.77	-1151.55	-451.77	10.83	15.49
3	-1151.60	-450.88	920.22	66.90	-1067.15	-434.14	11.95	17.70
4	-1067.27	-433.49	881.15	-31.13	-1344.35	-529.92	13.11	10.24
5	-1344.53	-530.40	1344.88	38.42	-1336.28	-606.30	9.01	20.00
6	-1339.18	-607.29	935.86	7.99	71.43	20.73	10.12	0.00

Note: Moments are reported at face of support

10 - MILD STEEL - NO REDISTRIBUTION

10.1 Required Rebar

10.1.1 Total Strip Required Rebar

Span	Location	From	To	As Required	Ultimate	Minimum
		ft	ft	in2	in2	in2
1	TOP	15.40	18.20	1.62	0.00	1.62
1	TOP	26.60	28.00	9.48	9.48	0.00
2	TOP	0.00	1.40	9.37	9.37	0.00
2	TOP	9.80	18.20	6.97	0.00	6.97
2	TOP	27.50	28.00	6.28	6.28	0.00
3	TOP	0.00	0.50	8.42	8.42	0.00
3	TOP	10.50	19.50	5.06	0.00	5.06
3	TOP	27.00	30.00	11.60	11.60	0.00
4	TOP	0.00	1.50	11.60	11.60	0.00
4	TOP	27.00	30.00	19.86	19.86	0.00
5	TOP	0.00	3.00	19.86	19.86	0.00
5	TOP	7.50	22.50	8.57	1.19	8.57
5	TOP	27.00	30.00	19.86	19.86	0.00
6	TOP	0.00	3.90	18.93	18.93	0.00
1	BOT	9.80	18.20	3.51	3.51	1.51
2	BOT	11.20	16.80	2.24	2.24	0.00
3	BOT	7.50	16.50	4.22	4.22	2.47
4	BOT	9.00	22.50	12.24	10.14	12.24
5	BOT	9.00	21.00	11.09	11.09	5.65
6	BOT	6.50	22.10	18.40	13.64	18.40

10.2 Provided Rebar

10.2.1 Total Strip Provided Rebar

Span	ID	Location	From	Quantity	Size	Length	Area
			ft			ft	in2
1	1	TOP	14.00	4	6	6.00	1.76
1	2	TOP	24.20	11	6	8.00	4.84
2	3	TOP	8.40	16	6	11.50	7.04
2	4	TOP	25.60	20	6	5.00	8.80
3	5	TOP	9.00	12	6	12.00	5.28
3	6	TOP	24.50	14	6	9.50	6.16
4	7	TOP	24.50	23	6	42.00	10.12
1	8	TOP	25.60	11	6	5.00	4.84
3	9	TOP	26.00	13	6	8.00	5.72
4	10	TOP	26.00	23	6	8.00	10.12
5	11	TOP	26.00	23	6	8.00	10.12
1	12	BOT	7.40	9	4	13.50	1.80

2	13	BOT	8.80	6	4	10.50	1.20
3	14	BOT	5.00	11	4	14.00	2.20
4	15	BOT	6.50	31	4	18.50	6.20
5	16	BOT	6.50	28	4	17.00	5.60
6	17	BOT	4.20	46	4	20.50	9.20
1	18	BOT	8.80	9	4	10.50	1.80
2	19	BOT	10.20	6	4	9.00	1.20
3	20	BOT	6.50	11	4	11.00	2.20
4	21	BOT	9.50	31	4	14.00	6.20
5	22	BOT	8.00	28	4	14.00	5.60
6	23	BOT	6.80	46	4	14.00	9.20

10.2.2 Total Strip Steel Disposition

Span	ID	Location	From	Quantity	Size	Length
			ft			ft
1	1	TOP	14.00	4	6	6.00
1	2	TOP	24.20	11	6	3.80
1	8	TOP	25.60	11	6	2.40
2	2	TOP	0.00	11	6	4.20
2	3	TOP	8.40	16	6	11.50
2	4	TOP	25.60	20	6	2.40
2	8	TOP	0.00	11	6	2.60
3	4	TOP	0.00	20	6	2.60
3	5	TOP	9.00	12	6	12.00
3	6	TOP	24.50	14	6	5.50
3	9	TOP	26.00	13	6	4.00
4	6	TOP	0.00	14	6	4.00
4	7	TOP	24.50	23	6	5.50
4	9	TOP	0.00	13	6	4.00
4	10	TOP	26.00	23	6	4.00
5	7	TOP	0.00	23	6	30.00
5	10	TOP	0.00	23	6	4.00
5	11	TOP	26.00	23	6	4.00
6	7	TOP	0.00	23	6	6.50
6	11	TOP	0.00	23	6	4.00
1	12	BOT	7.40	9	4	13.50
1	18	BOT	8.80	9	4	10.50
2	13	BOT	8.80	6	4	10.50
2	19	BOT	10.20	6	4	9.00
3	14	BOT	5.00	11	4	14.00
3	20	BOT	6.50	11	4	11.00
4	15	BOT	6.50	31	4	18.50
4	21	BOT	9.50	31	4	14.00
5	16	BOT	6.50	28	4	17.00
5	22	BOT	8.00	28	4	14.00
6	17	BOT	4.20	46	4	20.50
6	23	BOT	6.80	46	4	14.00

11 - MILD STEEL - REDISTRIBUTED

11.1 Required Rebar

11.1.1 Total Strip Required Rebar

Span	Location	From	To	As Required	Ultimate	Minimum
		ft	ft	in2	in2	in2
1	TOP	15.40	18.20	1.62	0.00	1.62
1	TOP	27.50	28.00	4.78	4.78	0.00

2	TOP	0.00	0.50	4.78	4.78	0.00
2	TOP	9.80	18.20	6.97	0.00	6.97
2	TOP	27.50	28.00	2.42	2.42	0.00
3	TOP	0.00	0.50	4.08	4.08	0.00
3	TOP	10.50	19.50	5.06	0.00	5.06
3	TOP	28.50	30.00	7.48	7.48	0.00
4	TOP	0.00	1.50	7.48	7.48	0.00
4	TOP	28.50	30.00	15.55	15.55	0.00
5	TOP	0.00	1.50	16.51	16.51	0.00
5	TOP	10.50	19.50	8.57	0.00	8.57
5	TOP	28.50	30.00	15.55	15.55	0.00
6	TOP	0.00	1.30	14.59	14.59	0.00
1	BOT	8.40	19.60	5.27	5.27	1.51
2	BOT	9.80	19.60	5.63	5.63	0.00
3	BOT	7.50	18.00	5.85	5.85	2.47
4	BOT	9.00	24.00	12.99	12.99	12.24
5	BOT	7.50	22.50	15.55	15.55	5.65
6	BOT	5.20	22.10	18.40	15.07	18.40

11.2 Provided Rebar

11.2.1 Total Strip Provided Rebar

Span	ID	Location	From	Quantity	Size	Length	Area
			ft			ft	in2
1	1	TOP	14.00	4	6	6.00	1.76
1	2	TOP	25.60	11	6	5.00	4.84
2	3	TOP	8.40	16	6	11.50	7.04
2	4	TOP	25.60	10	6	5.00	4.40
3	5	TOP	9.00	12	6	12.00	5.28
3	6	TOP	26.00	9	6	8.00	3.96
4	7	TOP	26.00	19	6	8.00	8.36
5	8	TOP	9.00	20	6	12.00	8.80
5	9	TOP	26.00	18	6	8.00	7.92
3	10	TOP	27.50	8	6	5.00	3.52
4	11	TOP	27.50	19	6	5.00	8.36
5	12	TOP	27.50	18	6	5.00	7.92
1	13	BOT	6.00	14	4	16.00	2.80
2	14	BOT	7.40	15	4	15.00	3.00
3	15	BOT	5.00	15	4	15.50	3.00
4	16	BOT	6.50	33	4	20.00	6.60
5	17	BOT	5.00	39	4	20.00	7.80
6	18	BOT	2.90	46	4	21.50	9.20
1	19	BOT	8.80	13	4	12.00	2.60
2	20	BOT	8.80	14	4	12.00	2.80
3	21	BOT	6.50	15	4	12.50	3.00
4	22	BOT	9.50	32	4	14.00	6.40
5	23	BOT	6.50	39	4	15.50	7.80
6	24	BOT	5.50	46	4	15.00	9.20

11.2.2 Total Strip Steel Disposition

Span	ID	Location	From	Quantity	Size	Length
			ft			ft
1	1	TOP	14.00	4	6	6.00
1	2	TOP	25.60	11	6	2.40
2	2	TOP	0.00	11	6	2.60
2	3	TOP	8.40	16	6	11.50
2	4	TOP	25.60	10	6	2.40
3	4	TOP	0.00	10	6	2.60

3	5	TOP	9.00	12	6	12.00
3	6	TOP	26.00	9	6	4.00
3	10	TOP	27.50	8	6	2.50
4	6	TOP	0.00	9	6	4.00
4	7	TOP	26.00	19	6	4.00
4	10	TOP	0.00	8	6	2.50
4	11	TOP	27.50	19	6	2.50
5	7	TOP	0.00	19	6	4.00
5	8	TOP	9.00	20	6	12.00
5	9	TOP	26.00	18	6	4.00
5	11	TOP	0.00	19	6	2.50
5	12	TOP	27.50	18	6	2.50
6	9	TOP	0.00	18	6	4.00
6	12	TOP	0.00	18	6	2.50
1	13	BOT	6.00	14	4	16.00
1	19	BOT	8.80	13	4	12.00
2	14	BOT	7.40	15	4	15.00
2	20	BOT	8.80	14	4	12.00
3	15	BOT	5.00	15	4	15.50
3	21	BOT	6.50	15	4	12.50
4	16	BOT	6.50	33	4	20.00
4	22	BOT	9.50	32	4	14.00
5	17	BOT	5.00	39	4	20.00
5	23	BOT	6.50	39	4	15.50
6	18	BOT	2.90	46	4	21.50
6	24	BOT	5.50	46	4	15.00

10.3 - Base Reinforcement

10.3.1 Isolated bars

Span	Location	From	Quantity	Size	Cover	Length	Area
--	--	ft	--	--	in	ft	in2
1	TOP	.00	8	6	1.00	6.16	3.52
1	TOP	21.84	8	6	1.00	12.32	3.52
2	TOP	21.84	8	6	1.00	12.46	3.52
3	TOP	23.70	8	6	1.00	12.60	3.52
4	TOP	23.70	8	6	1.00	12.60	3.52
5	TOP	23.70	8	6	1.00	12.54	3.52
6	TOP	19.76	8	6	1.00	6.24	3.52

10.3.2 Mesh Reinforcement

#	Span	Location	From	Spacing	Size	Cover	Length	Area
--	--	--	ft	in	--	in	ft	in2
1	1	BOT	.00	24.00	4	1.00	28.00	2.80
	2	BOT	.00	24.00	4	1.00	28.00	2.80
	3	BOT	.00	24.00	4	1.00	30.00	2.80
	4	BOT	.00	24.00	4	1.00	30.00	2.80
	5	BOT	.00	24.00	4	1.00	30.00	2.80

13 - PUNCHING SHEAR REINFORCEMENT

13.1 Critical Section Geometry

Column	Layer	Cond.	a	d	b1	b2
			in	in	in	in
1	1	2	4.13	8.25	16.13	20.25
2	1	1	4.13	8.25	20.25	20.25
3	1	1	4.13	8.25	20.25	20.25
4	1	1	4.13	8.25	20.25	20.25

5	1	1	4.13	8.25	20.25	20.25
6	1	1	4.13	8.25	20.25	20.25
7	1	2	4.13	8.25	16.13	20.25

13.2 Critical Section Stresses

Label	Layer	Cond.	Factored shear	Factored moment	Stress due to shear	Stress due to moment	Total stress	Allowable stress	Stress ratio
			k	k-ft	ksi	ksi	ksi	ksi	
1	1	2	-160.68	-0.02	0.37	0.110	0.481	0.240	2.001
2	1	1	-629.20	+0.01	0.94	0.000	0.942	0.319	2.955
3	1	1	-598.70	+0.02	0.90	0.000	0.896	0.319	2.812
4	1	1	-428.20	+0.00	0.64	0.000	0.641	0.291	2.206
5	1	1	-623.14	+0.00	0.93	0.000	0.933	0.291	3.210
6	1	1	-627.69	+0.00	0.94	0.000	0.939	0.291	3.233
7	1	2	-141.68	-0.00	0.33	0.097	0.424	0.240	1.764

13.3 Punching Shear Reinforcement

Reinforcement option: Stirrups

Bar Size: 4

Col.	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs	Dist	N_Legs
	in		in		in		in		in	
1	***	***								
2	***	***								
3	***	***								
4	***	***								
5	***	***								
6	***	***								
7	***	***								

Dist. = Distance measured from the face of support

Note: Columns with --- have not been checked for punching shear.

Note: Columns with *** have exceeded the maximum allowable shear stress.

14 - DEFLECTIONS

14.1 Maximum Span Deflections

Span	SW	SW+PT	SW+PT+ SDL	SW+PT+SDL +Creep	LL	X	Total
	in	in	in	in	in	in	in
1	0.22	-0.10	-0.04	-0.11(3079)	0.25(1331)	0.00(*****)	0.16(2164)
2	0.04	-0.17	-0.15	-0.46(724)	0.22(1518)	0.00(*****)	-0.24(1385)
3	0.13	-0.15	-0.11	-0.34(1062)	0.13(2751)	0.00(*****)	-0.22(1630)
4	0.11	0.15	0.19	0.56(640)	0.07(4845)	0.00(*****)	0.64(566)
5	0.10	-0.27	-0.24	-0.73(495)	0.37(972)	0.00(*****)	-0.36(1012)
6	0.14	0.18	0.22	0.67(466)	0.14(2191)	0.00(*****)	0.81(386)

16 - Unbalanced Moment Reinforcement

16.1 Unbalanced Moment Reinforcement - No Redistribution

Joint	Gamma Left	Gamma Right	Width Left	Width Right	Moment Left Neg	Moment Left Pos	Moment Right Neg	Moment Right Pos	As Top	As Bot	n Bar Top	n Bar Bot
			ft	ft	k-ft	k-ft	k-ft	k-ft	in2	in2		
1	0.00	0.60	0.00	3.50	0.00	0.00	0.00	78.95	0.00	0.00	0	0
2	0.60	0.60	3.50	3.50	-2.97	0.00	-34.14	0.00	0.00	0.00	0	0
3	0.60	0.60	3.50	3.50	-75.78	0.00	-11.68	0.00	0.00	0.00	0	0
4	0.60	0.60	3.50	3.50	0.00	0.00	-14.95	0.00	0.00	0.00	0	0
5	0.60	0.60	3.50	3.50	-18.12	0.00	-71.41	0.00	0.00	0.00	0	0
6	0.60	0.60	3.50	3.50	-82.53	0.00	-17.91	0.00	0.00	0.00	0	0

7	0.60	0.00	3.50	0.00	0.00	69.43	0.00	0.00	0.00	0.00	0	0

16.2 Unbalanced Moment Reinforcement - Redistributed

Joint	Gamma Left	Gamma Right	Width Left	Width Right	Moment Left Neg	Moment Left Pos	Moment Right Neg	Moment Right Pos	As Top	As Bot	n Bar Top	n Bar Bot
			ft	ft	k-ft	k-ft	k-ft	k-ft	in2	in2		
1	0.00	0.60	0.00	3.50	0.00	0.00	0.00	79.74	0.00	0.00	0	0
2	0.60	0.60	3.50	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0	0
3	0.60	0.60	3.50	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0	0
4	0.60	0.60	3.50	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0	0
5	0.60	0.60	3.50	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0	0
6	0.60	0.60	3.50	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0	0
7	0.60	0.00	3.50	0.00	0.00	70.12	0.00	0.00	0.00	0.00	0	0

At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

Africa	+ 27 11 254 4800
Asia	+ 852 2562 3658
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

solutions@golder.com
www.golder.com

Golder Associates Inc.
18300 NE Union Hill Road, Suite 200
Redmond, WA 98052 USA
Tel: (425) 883-0777
Fax: (425) 882-5498

Golder Associates